



FRIDAY, JUNE 1, 1894.

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The office of the Railroad Gazette is now at 32 PARK PLACE, New York.

Contributions.

Good Discipline Easily Attainable if You Want It.

LEXINGTON, Ky., May 19, 1893.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The statements of the writers in last week's issue of the *Railroad Gazette* do not give due credit to those officers who have recognized the necessity for thorough discipline in the train service, and provided for it. The writer has been connected with managements whose organization, and the results, have been excellent, but the systems have been personal, never officially adopted by the company, and have terminated with the officers originating them. Under these officers the train masters' duties were to furnish and maintain a well disciplined force for the operation of the train service; to employ discipline and when necessary dismiss any of the train or yard force. They were responsible for the safe and prompt movement of traffic as far as well trained efforts of the train force could secure it, and their rise or fall depended on the result.

The direction of the movement of the traffic and all detail work connected with it, and the economy of the same, were the duty of the chief train dispatcher, and he was responsible to the superintendent for the correct and proper management of the power, equipment and force.

The train master, having no office work, spent his whole time on the road, except what was necessary for investigation. His office was honorable and he kept close and constant supervision of the men. He was always considered in line of promotion to the superintendency of a division if his work merited it.

But, with the change of officers, the close organization uniformly failed. The system followed the man and left the railroad. The train master became an office man, defining his own duties. If the superintendent was weak the train master became the actual superintendent, and if not permitted to do this, he assumed the duties of chief dispatcher, or, in some cases, did nothing, and in all cases the road was without a disciplinarian. The exclusively railroad journals have touched very little on the details of effective organization of the train service, and with the data that could be obtained, it could be shown that the principal defects have been well covered by some men, and the best systems have passed beyond the experimental stage. At least this is the opinion of one who has been 25 years in the service.

A. J. L.

The Division of East Bound Freight from Chicago.

CHICAGO, May 26, 1894.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I have just read the article in the *Railroad Gazette* of yesterday, concerning the confused ideas about pooling that are so widely published of late. There has been so much said in the daily papers lately about the Central Traffic Association agreement as being a "pool" and a "money pool," that I quite agree with you that some explanation is due the public as to exactly what is proposed to be accomplished. I am in position to state positively that there is nothing in the agreement that in any way, directly or indirectly, provides for the settlement of balances by money liquidation. It is simply and only an agreement on the part of the eastbound lines to endeavor to limit their tonnage to such amounts as have been agreed upon between them, or may hereafter be agreed upon, for the purpose of bringing about stable and reasonable rates. It provides that in case any line shall find itself "over" the agreed amount of tonnage for any month, it shall endeavor in the succeeding month to limit its carryings to such an extent as will equalize the two months. To do this, three courses are open to it: It may divert unconsign freight to the line or lines in deficit; it may legally advance its rates on certain classes or commodities, with the purpose of causing the traffic to flow to the other lines; or, it may agree with the line in deficit, and that line may

have the Commissioner authorize it to temporarily reduce certain rates until its traffic shall have equalized the deficit. The roads emphatically disclaim that the agreement is in any way in contravention of law. On the other hand, it appears to them to be the best and only method that can be pursued which will preserve equitable conditions of rates and prevent the "undue preferences" and "unjust discrimination" which the law now prohibits, and at the same time save them from disaster, pending some amendment to the present law.

R. S. D.

The Railroads in Art.

PITTSBURG, Pa., May 26, 1894.

TO THE EDITOR OF THE RAILROAD GAZETTE:

There is a picture in *Harpers' Weekly* of May 26, entitled "The Khojak Tunnel," in which two hand cars are shown tearing down a grade of 1 in 35 at the rate of 30 miles an hour. The artist makes the grade at least 1 in 12, and has distinguished himself in the details.

The officer in uniform on the first car is easily recognized as Lord Clarence Fitzhugh, of the 52d Highland Lancers, and the civilian can be none other than the Hon. Ponsonby De Smythe, assistant to the Assistant Inspector General of Nut Locks for the Government Railroad of India. They are evidently returning from some 5 o'clock function on the hills to their bungalows in the plains below, and have evidently taken several b's and s's, judging by Lord C.'s utter disregard of the law of gravity. It is dollars to doughnuts that the Hon. De Smythe's eyes get full of smoke and cigar ashes before they reach the foot of the hill.

The sticks with the rags on are evidently intended for markers, showing second section following close.

The method of braking is novel, and evidently the idea originated in the fertile brains of the Chief Engineer of the Government Railroad of India, that if all people would brake on one side they would finally make the side ditches. The slave of Allah is evidently preparing to grasp the first opportunity to part company with the unbelievers. The description does not state whether these travellers reached the plains in safety.

The art editor ought to give his next contract of this sort to a practical trackman.

MULVANEY.

Storage Battery Lighting on the Chesapeake & Ohio.

It is generally known that certain trains on the Chesapeake & Ohio have been lighted by storage battery for some months, and the experiment has now been carried far enough to enable one to draw some conclusions as to its practical success. Thirty-three cars are equipped, being eight coaches, eight combination cars, eight express cars, five dining cars and four postal cars. These run mostly in the service between New York and Cincinnati.

A comparative statement of cost of working and maintenance, including interest on the total investment, has been made for the General Manager. This comparison is between the 33 storage battery cars, 21 Pintsch gas cars and 137 cars lighted with kerosene oil. The comparison indicates that the cost of the electric lighting is about 13 per cent. less than that of lighting with Pintsch gas, and 70 per cent. more than that of lighting with oil lamps. We give these figures, however, as being still quite uncertain, and are not yet so convinced of their accuracy as to venture to publish them in detail. They show what the company has learned, so far as it has gone, but there is reasonable doubt if, after a year or two more of trial, including all the elements of cost, the figures, as between the Pintsch gas and the electric light, would not be reversed.

The system used is the Silvey storage battery. This battery is built up of lead plates or "grids" laid horizontally, the positive and negative plates being separated by a special packing. These plates are cast with rectangular cells, which cells hold the active material, and each pile is carried in a hard rubber jar and covered with acid. The life of the negative plates is not exactly known, but it is probably about eight or nine years. The life of the positive plate is about 18 months. The limit of life is the destruction of the material carried in the plates, and not of the plates themselves. This destruction is hastened by the severe service to which the battery is subjected in railroad use; that is, the constant jar from the running of the train and the shocks due to loading and unloading the batteries.

The train unit of battery is a certain number of cells, in an oblong box, weighing about 600 lbs., and two of these boxes are called a set. These are carried underneath the middle of the car, the boxes which receive them being fastened to the framing and having end doors and being provided with rollers on the bottom, so that the boxes carrying the batteries may be conveniently slid in and out. An ordinary coach may be lighted for the run from New York to Cincinnati and back by two sets, that is, 2,400 lbs. of battery, although the sleepers, the postal cars and the dining cars, and perhaps some of the coaches, carry three sets, say 3,600 lbs. This battery force gives about 20 hours lighting with 148.8 candle power in each car. As a matter of fact, the dining cars have sufficient current stored to last them five or six days, they often being recharged on the sixth day.

The light is perfectly steady and entirely satisfactory; in fact, nothing could be better, and the cars are run from Cincinnati to New York and back with no attention whatever; the porters and trainmen simply turn on the light when it is wanted. The cleanliness, coolness and convenience of the system are surely very great, and the convenience is particularly noticeable on a road having so

many tunnels as are found on the Chesapeake & Ohio, for a few lights may be turned on and off instantly in any one car.

The charging plant at Covington, Ky., contains a 70 H. P. engine and two dynamos, which are run 10 hours a day steadily charging the batteries. Here, also, repairs are made. Each cell of battery is tested every time it comes into the charging station, and if found at all defective is taken out and repaired.

What appears to be a serious objection to the system is the inconvenience of handling the batteries in changing them in and out of the cars. We have said that the unit weighs about 600 lbs. Moreover, the batteries must be handled with care; therefore, it is necessary to have a track on which the cars containing the batteries to be renewed may be run, whenever they come into the terminal station. Then it takes two men to handle each box containing the batteries. A special hand truck is provided, which has an ingenious arrangement by which its bed can be raised and lowered by a screw motion and inclined one way or the other. This truck is run alongside the boxes under the car, the bed adjusted to the proper level, the batteries hauled out, rolled into the charging room and there shifted on to the beds, where they stand to be recharged. Another set of batteries is transferred from the beds to the cars in the same way. Rollers are provided on the bed of the truck, and on the charging bed to facilitate sliding the boxes back and forth. Probably 20 minutes, possibly half an hour, would not be too much time to allow for two men to change the batteries under one car. It is obvious that for recharging, the compressed gas system is far more convenient than this, for pipes can be laid almost anywhere, and one man can attend to all the work of gasing. It has been suggested that it would be practicable to change the batteries without running the cars to the charging station; that is, to transport them to and from the car by wagon. But when one considers the weight of the batteries, it will be apparent that the cost of trucking would be a great addition to the annual cost of working in this way. Moreover, it is believed by experts that the depreciation of the batteries, due to hauling them back and forth over city streets, would be so rapid as to prohibit this method of handling.

The same system was used for a year on the Atchison, Topeka & Santa Fe on one train running between Topeka and St. Joseph, the round trip being 143 miles; and, so far as we have ever heard, the light gave no trouble whatever, the only complaint being the labor of handling the batteries.

New Freight Agreement of Western Roads.

The Presidents of the Western Lines, at their meeting in Chicago, last week, unanimously adopted an agreement placing the making and maintenance of freight rates absolutely in the hands of the executive officers of the interested roads.

The preamble to the agreement states that it is a plan whereby freight traffic rates of May 1, 1894, shall be faithfully maintained by the several companies throughout the territory, West, Northwest and Southwest from Chicago and St. Louis.

Section 1 states the purpose of the agreement to be the maintaining of uniform, reasonable and stable rates for the transportation of freight within the territory of the Western Freight, Southwestern Traffic and Trans-Missouri Associations. Provision is made for three committees, termed respectively the Western Trunk Line Committee, the Southwestern Traffic Committee and the Trans-Missouri Traffic Committee, consisting of the respective freight traffic officers of the several lines operating in each territory.

Sections 2, 3 and 4 make it the duty of these committees to maintain legal and reasonable rates, divisions, classifications and regulations, subject to the rules and requirements of the association within whose territory they legislate. Each committee has authority to make effective its unanimous action, and is to be held responsible for the proper conduct of traffic within its jurisdiction. Provision is made for a chairman for each committee, to be elected by majority vote, and for the necessary machinery for conducting business.

Section 5 provides that, in case of failure of any committee to agree, the chairman of the committee shall report the same to the officer in charge of the association, in whose territory the controversy arises, and the latter shall at once lay it before the executive officers of the roads, who are to meet as soon as possible and dispose of it.

Section 6 provides for the formation of an Executive Board, to be composed of the president, vice-president or their authorized representatives, of the companies comprised in the various committees.

Section 7 states the power of this Board to be to establish and maintain uniform and reasonable rates between competitive points in the territory of either association, and to decide all questions of common interest between the members.

Section 8 is as follows: "No reduction in rates shall be made under the notices as prescribed in the agreements of the Western Freight Association, the Southwestern Traffic Association or the Trans-Missouri Association; but such right shall be restricted in its exercise to meetings of the Executive Board. No arrangements of any character whatsoever shall be made by the parties hereto which will prevent the advance of any rate upon legal notice."

Section 9 provides for a physical division of tonnage, to be inaugurated whenever and wherever, in the judgment of the Executive Board (or the interested members thereof)

such apportionments shall be deemed practicable or advisable. The allotments, when made, are to be equalized by diversions ordered from time to time by the Commissioner in charge.

There is no penalty clause for failure to divert freight, but the agreement includes a pledge by each subscriber in behalf of his company, of a willing and prompt compliance, so far as may be practicable, with all such orders.

In case an order to divert freight is not complied with, within the time considered reasonable by the party giving the order, or the agreement as a whole or in part seems jeopardized, a meeting of the Executive Board is to be called without delay to determine upon necessary action.

Resolutions were passed, pledging the lines to the full restoration of all rates, and the absolute maintenance thereafter of such rates, until due and reasonable notice shall be given of intention to deviate therefrom.

Subsequently, the Executive Board organized by the election of Marvin Hughitt, President of the Chicago & Northwestern, Chairman; C. G. Warner, Vice-President Missouri Pacific, Vice-Chairman; J. W. Midgley, Chairman Western Freight Association, Secretary.

The lines signing the agreement are: Atchison, Topeka & Santa Fe; Burlington & Missouri River in Nebraska; Chicago & Alton; Chicago, Burlington & Quincy; Chicago, Great Western; Chicago Milwaukee & St. Paul; Chicago & Northwestern; Chicago, Rock Island & Pacific; Denver & Rio Grande; Fremont, Elkhorn & Missouri Valley; Illinois Central; Kansas City, Ft. Scott & Memphis; Missouri, Kansas & Texas; Missouri, Pacific; Rio Grande Western; St. Joseph & Grand Island; St. Louis & San Francisco; St. Louis Southwestern; Southern Pacific (Atlantic System); Texas & Pacific; Union Pacific; Union Pacific, Denver & Gulf; Wabash; Wisconsin Central.

The Götsdorf System of Compounding Locomotives.

The main difficulty encountered by designers of two-cylinder compound locomotives has been that of providing for the starting of the locomotive when the high pressure crank was on the centre, or the high pressure valve in such a position as to cover both steam ports. In order to

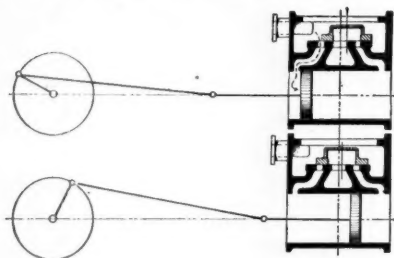


Fig. 1.

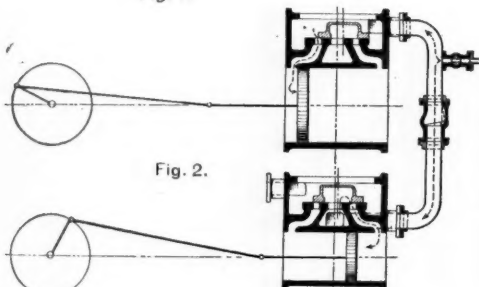


Fig. 2.

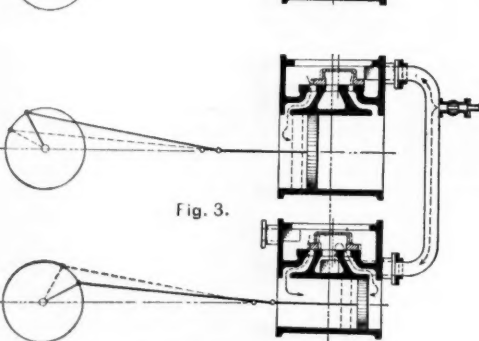


Fig. 3.

Götsdorf System of Compounding.

meet this difficulty various means have been devised for admitting steam to the low-pressure cylinder, its crank being then in a position to do considerable work.

In a single expansion locomotive, the least favorable position from which to start is that in which one of the valves has just closed the steam port as shown in Fig. 1. The valve on the opposite side will then admit steam to its cylinder though the crank will be but little past the center, its angle depending on the lateness of cut-off in the other cylinder. Even under such conditions a locomotive will start quite promptly though the tangential effort is necessarily low.

With a two-cylinder compound, in order to provide for promptly starting under all circumstances, it is necessary that some arrangement be made by which steam from the boiler can be admitted to the low pressure steam chest and thence to the cylinder. This may either be automatic or be placed under the control of the engineer. It will be seen that ordinarily the steam thus admitted to the low

pressure steam chest will flow back through the receiver to the under side of the high pressure valve, and thence to the cylinder, thus working against the steam in the low pressure cylinder. It will also be observed by reference to Fig. 2 that with an early maximum cut-off, the high pressure

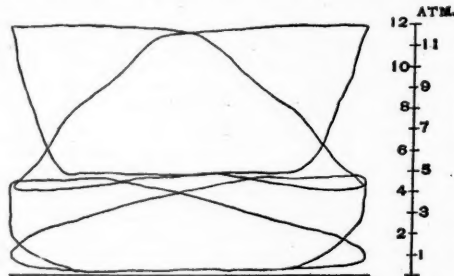


Fig. 4.

crank will be in a more effective position than that of the low pressure side. In order to prevent the steam from thus backing up to the high-pressure cylinder the receiver is sometimes provided with some form of check valve, as also shown in Fig. 2, which usually opens after one or two exhausts from the high pressure cylinder. If, however, the cut-off in the high pressure cylinder takes place

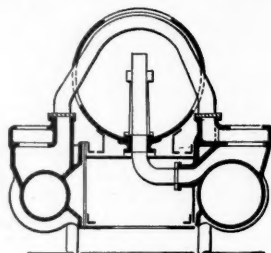


Fig. 5.

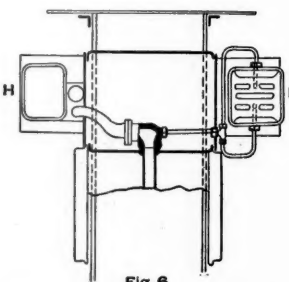


Fig. 6.

Figs. 5 and 6. Sections of Smoke-Box.

somewhat later in the stroke, the low pressure crank will be found to have moved to a position more nearly at right angles to the axis of the cylinder, while the angle between the high-pressure crank and the axis of the cylinder will have become more acute, the low pressure crank thus being in a more effective position, as shown in Fig. 3.

Mr. K. Götsdorff, of the Austrian State Railroads, has taken advantage of this fact in the development of his system of compounding locomotives. By using the Walschaert valve gear, with which a cut-off of 90 to 92 per cent.

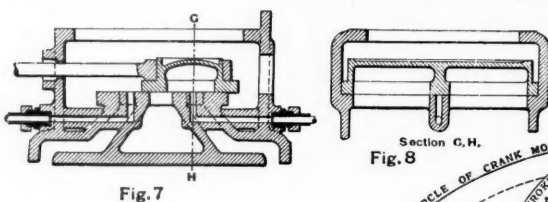


Fig. 7.

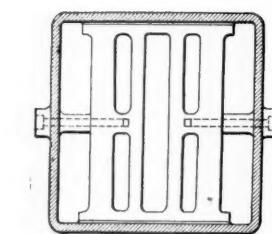


Fig. 8.

Section C, H.

Fig. 8.

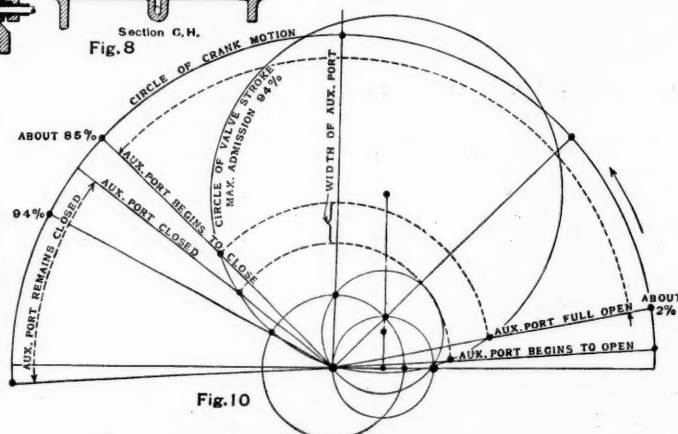


Fig. 9.

Fig. 10. Diagram of the steam distribution according to Zeuner.

Fig. 10.

Fig. 10. Diagram of the steam distribution according to Zeuner.

can be obtained, he finds it possible to neglect the counter effect of the steam on the high pressure piston at starting and thus avoids the use of any form of intercepting or check valve. Figs. 5 to 9 inclusive show the general features of construction of this system. A copper pipe

about one inch in diameter leads from the main steam pipe to the low pressure steam chest, where the current of steam is divided and led in two smaller pipes to fittings at the ends of the steam chest. From this point holes are drilled inward through the valve seat to meet others which are drilled downward through a bridge in the steam ports. The small openings or auxiliary ports thus formed in the valve seat are covered by a bridge across the inside of the valve, and are so located as to admit steam to the low pressure steam chest only when the reverse lever is in full gear or nearly so. The high pressure valve has the usual construction.

With the reverse lever in full gear, the position of the low pressure valve will be such that it will cover these auxiliary ports unless the high pressure valve has closed, in which case the auxiliary ports will admit steam to the low pressure steam chest and furnish the requisite supply to the cylinder. After starting, the reverse lever is hooked up, thus reducing the valve travel and keeping the auxiliary ports covered. In case of heavy work, necessitating a later cut-off, the admission of the steam to the low pressure steam chest will serve to slightly increase the steam pressure in that cylinder and thereby helps to increase the power of the locomotive. The Zeuner valve motion diagram, Fig. 10, shows the distribution of steam by this system with the Walschaert valve gear. It will be noticed that the auxiliary ports in full gear are opened at about 2 per cent. of the stroke and closed at 85 per cent.; also that with a cut-off at half stroke the auxiliary ports are not uncovered at all. These proportions can, of course, be changed within certain limits. The Stephenson, Gooch, Allan and Joy valve gears can be so proportioned as to give good results with this system of compounding locomotives. The principal advantage claimed for this system, aside from its economy, is its simplicity and consequent freedom from repairs of any kind. Its operation is in no way different from that of a single expansion locomotive.

Fig. 4 shows a diagram from a locomotive compounded after this system, taken at a speed of about 9 miles per hour, with a steam pressure of about 185 pounds, and cutting off at 51 per cent. of the stroke. The first compound locomotive constructed upon this system was built and put in service upon the Austrian State Railroads in 1892. There are now twenty-one in service on these lines, while forty-one are being built for Russian roads and sixteen for other European countries. The above engines are intended for passenger service. Thirty freight engines are now under construction for the Austrian State Railroads.

The Nathan Manufacturing Co. of 92 & 94 Liberty street, New York, are introducing the Götsdorf system in the United States and are prepared to adapt the device to new locomotives or to locomotives already constructed.

Air-Brake Men's Association.

The first annual convention of this association was held in Columbus, O., on April 10. The papers that were read have been published in the *Railroad Gazette* as follows: How to Instruct Trainmen and Inspectors about Air Brakes, April 27, page 308; Handling Trains Wholly Equipped and Partially Equipped with Air Brakes, same date, page 296; Maintenance of Freight and Passenger Brakes, same date, page 297; Cleaning and Oiling Triple Valves and Brake Cylinders, May 4, page 318; Air Pump Repairs, May 18, page 352.

The full report of the proceedings of the convention has just been put in print. A pleasant opening address was made by President C. C. Farmer. He spoke of the desirability of having the Air-brake Men's Association and the Traveling Engineers' Association hold their annual conventions the same week, in order to increase the membership and promote the efficiency of both associations. At the afternoon session addresses were made by Mayor Karb, President Felton, of the Board of Trade, and Senator McMaken.

While waiting for certain committees to report, there was an informal discussion as to how strict a construction should be put upon Article 3, Section 1 of the constitution, which requires a candidate for membership to have a thorough practical knowledge of air-brakes; and the matter

was referred to a committee with instructions to revise this section and have it conform to the sentiments of the members present, a majority of whom held that a liberal construction should be placed upon this clause.

There was a suggestion that the association select some technical paper as an official organ, but on motion of Mr. Conger it was voted that the proceedings be given out impartially to all mechanical papers asking for them. On motion of Mr. Kidder the engraved membership card was ordered changed so as to read "Air-Brake Men" instead of "Air-Brakemen."

In the discussion on the report on Cleaning and Oiling

three miles, and we have automatic couplers and non-automatic couplers. That is a very difficult train to run; and having a small main reservoir, $26\frac{1}{2} \times 33$, we found we had to run main reservoir pressure up very high, and the packing had to be of the best kind to stand it. We started in trying bird shot (No. 4, I think), as a packing, and have had most excellent results; we only had to pack the pump once, and it never leaked after it left the shop; but we find that we are obliged to put asbestos in the end close to piston head. It was chain-gang engines that brought this about.

Mr. Fowler: I have experimented with No. 8 bird shot

The latter difficulty was met by turning the machine around so as to give the operator the front of the tower instead of the back, according to the usual practice. This arrangement has given excellent satisfaction, however, and has been adopted at other points on the Pennsylvania with good results. This disposition of the machine made it possible to have a platform under the side of the tower of sufficient width and head room to serve the purposes of the Express Co. The construction of the tower is shown in plan and sectional elevations in Fig. 3. It will be observed that the bottom line of the stringers of Madison street bridge are 5 ft. 6 in. above the floor line of the

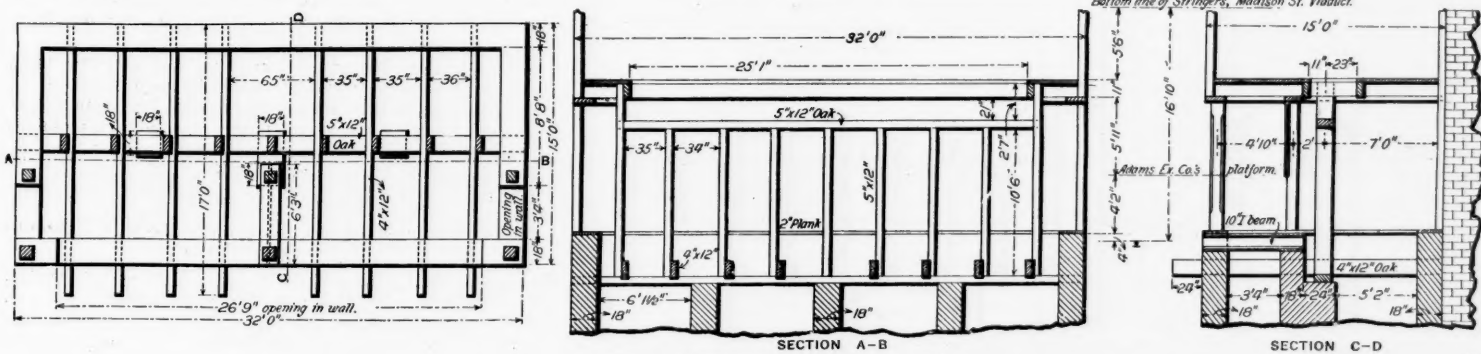


Fig. 3.—Framing of Signal Tower.

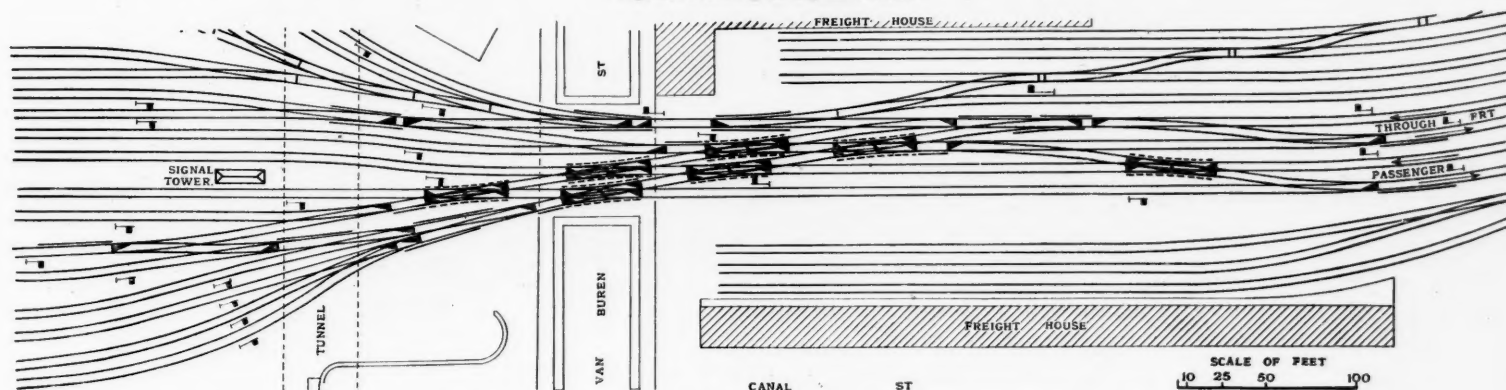


Fig. 2.—Signals at South End of Union Station.

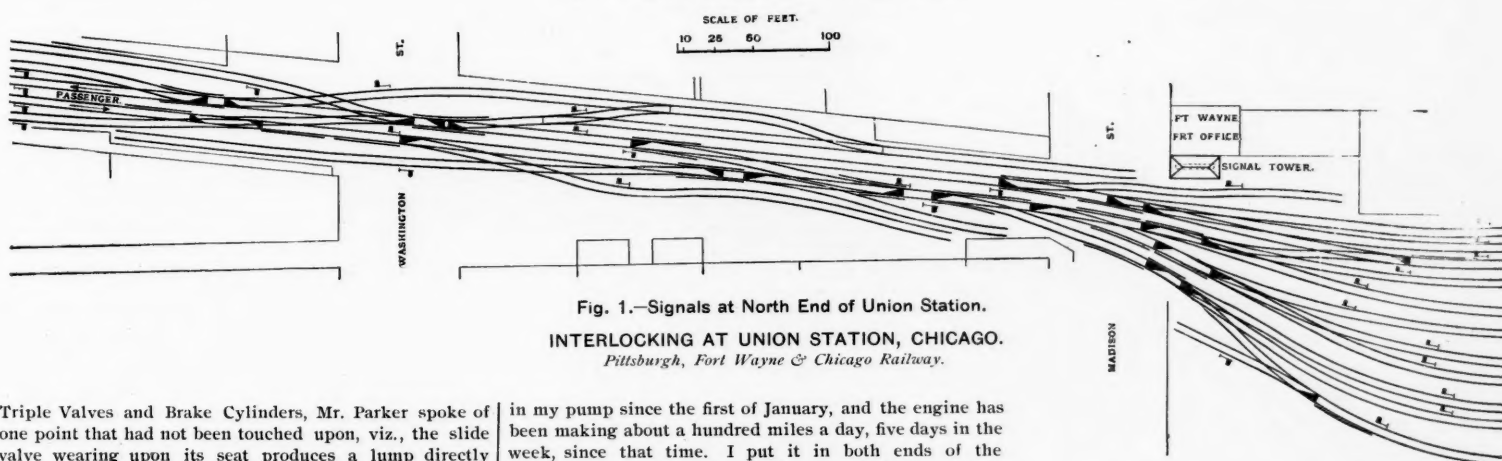


Fig. 1.—Signals at North End of Union Station.

INTERLOCKING AT UNION STATION, CHICAGO.

Pittsburgh, Fort Wayne & Chicago Railway.

Triple Valves and Brake Cylinders, Mr. Parker spoke of one point that had not been touched upon, viz., the slide valve wearing upon its seat produces a lump directly under the cavity, in making frequent service applications, and a blow at the exhaust port, when a full or emergency application is made, will result. Remove this lump and the blow will cease. He came to the conclusion that that lump on the slide valve seat scratched the end of the slide valve, when it was drawn down over it when an emergency application was made.

Mr. Nellis spoke of the necessity of oiling the carriers which support the cylinder and Hodge levers on passenger cars, as they cause a very disagreeable noise on passenger trains. Mr. Houchin, speaking of oiling brake cylinders, thought there should be no difference between passenger and freight cars. While the latter do not run as much the leather packing gets hard and stiff while the cars are standing still.

In the discussion on the paper on Air Pump Repairs a number of members gave their experience with metallic packing. Mr. Best said: On some roads where 35 or 40 cars are handled down heavy mountain grades, you won't find a packing every day that will stand such severe work. It burns out. On the Southern Pacific I put up 80 8-in. pumps with metallic packing, and at that time found it was the only thing which would stand. I found, on one occasion, that the packing would run for eight months without being renewed. Metallic packing is about as good a thing in air pumps as I have ever seen, because it will not burn out just the time you want it; but it requires constant and regular oiling.

Mr. Kidder spoke of finding an outside leak in the piston end when the piston moved backward, and that a good deal of air was lost where there was defective packing in the air piston.

Mr. Carney: Upon the Ashland Division of the Chicago & Northwestern we now have twenty-six car trains running down a grade where we don't use steam for forty-

in my pump since the first of January, and the engine has been making about a hundred miles a day, five days in the week, since that time. I put it in both ends of the pump, and put nothing else in the stuffing boxes with it. I found, as far as the steam ends were concerned, it gave good results; but in the high pressure air cylinder, I found I had to use asbestos to help along.

Interlocking Plants at Union Station, Chicago.

The Union Switch & Signal Co. completed, about a year ago, the installation of two mechanical interlocking plants at the "Union Depot" in Chicago, which possess a number of interesting features. This station, which is located on the west side of the river and fronting on Canal street, is approached both from the north and the south, the Chicago, Milwaukee & St. Paul, and the Pittsburgh, Cincinnati, Chicago & St. Louis approaching from the north, and the Chicago & Alton, Chicago, Burlington & Quincy, and Pittsburgh, Fort Wayne & Chicago coming in from the south.

The plan of the yard north of the station is shown in Fig. 1, the main inward and outward passenger tracks being indicated by arrows. The location of the signal tower for the operation of this plant was rather a perplexing question, as the tracks are crossed at Madison street by a viaduct, the abutments of which are quite close to the tracks, thus making it necessary that the tower be placed near by in order to give the operator a good view of the yard. The tracks being spaced so closely, the location adopted was obviously the most desirable one. The situation was further complicated, however, by the fact that the Adams Express Co. had a platform at this point about six feet in width, and also by the fact that a man standing in the side of the tower farthest from the tracks would be unable to see a part of the yard on account of the abutments already mentioned, and other obstructions along the tracks north of the viaduct.

tower, thus affording the operators an unobstructed view of the upper part of the yard.

The machine in this tower has a 60 lever frame with 52 working levers distributed as follows: 21 levers for 25 switches, 11 levers for 25 locks and 20 levers for 28 signals.

Fig. 2 shows the plan of the yard south of the station. The tower in this case is located near the north end of the yard and a short distance away from the Van Buren street viaduct. The space between tracks is limited here also, and the tower has a width of but six feet, from the ground up to the floor framing of the room above, which is placed at such a height as to clear the smoke jacks of passing cars. This tower is of sufficient length to accommodate a 72 lever frame. The machine is equipped with 68 levers, 36 of which work 47 switches and 7 movable point frogs, 15 work 61 facing point locks, and 17 work 24 signals. All switches in both yards have independent facing point locks. An unusual feature of these yards is the absence of all high signals. None but dwarf signals are used and each of these is located in its proper place, another unusual thing.

The greater part of the passenger traffic of the Chicago & Alton, Chicago, Burlington & Quincy, and Pittsburgh, Fort Wayne & Chicago, is handled over the two west tracks, though some of it goes over the two tracks adjoining, which are also used for a part of the freight movements through the yard. The remainder are freight and storage tracks.

The designing and arrangement of these plants was done by Mr. W. M. C. Grafton, Engineer of Signals of the Pennsylvania Lines west of Pittsburgh, to whom we are indebted for the drawings and information.

Coaling Wharf of the Pittsburgh, Cincinnati, Chicago & St. Louis Railway.

The illustrations given with this are interesting for several reasons; they show another adaptation of the transmission of power about railroad plant by means of compressed air; and on how small a piece of ground a very

air reservoir, coal wharf and coaling and supply tracks, and the limited space available between Curtis and May streets for the location of sand-house, coaling wharf and ash pit. The details of the coaling wharf are shown in Figs. 2, 3 and 4. The plant was designed to lift coal from the supply tracks to the tenders of locomotives, and incidentally a very convenient and accurate means of weighing each dump of coal given to each locomotive was also provided. As the distance to the nearest available boiler was rather great for the economical use of steam in

hoisting engines, compressed air was considered preferable to separate a boiler and hoisting engine, and the necessary attendance.

The air for operating the lifts is compressed by two 9 $\frac{1}{2}$ -in. Westinghouse air pumps, located, as shown in the right

observed pressure. The air is again turned into the cylinder and the car is raised to the top and is rolled off. The elevator is lowered by its own weight when the air is allowed to escape from the cylinder to the atmosphere through the three-way cock. As the dump cars are emptied they are rolled to the elevator at the left end of the trestle, as shown in the cut, and lowered to the ground. To assist in handling the cars the tracks on which they roll are laid on a grade in the direction in which the cars move.

When this coaling station was planned, it was found that only a limited space could be allotted to it and how well the conditions have been met will be understood from the foregoing; the space occupied by the wharf proper is only about 150 ft. long and the width of two tracks.

The plant has been in operation a year and has proved very satisfactory; the cost of handling coal at it is very low. The number of locomotives provided for at the station is not large, but at certain hours it happens that a number arrive at about the same time and it is necessary to handle them with great dispatch.

Electric Disturbances on the Brooklyn Elevated Railroad Structure.

We have recently published some account of how damage is done to underground pipes and cables by electrolytic action due to the presence of the strong electric currents of the street railroads near by. But the trouble is not all underground.

In building the extension of the Fifth Avenue branch of the Brooklyn Elevated Railroad to the city line at Sixty-seventh street and Third avenue, the company found difficulty in securing certain property rights between Thirty-eighth street and Fifth avenue and Fortieth street and Third avenue. Pending the settlement of this matter the structure south from Fortieth street was erected. Upon its completion the work of joining the two parts was pushed forward, commencing at Thirty-eighth street, the former terminus. While hoisting into position the first of the last four 65 ft. longitudinal girders necessary to connect the two sections, the end not yet in position came in contact with the transverse girder. Immediately the metal was melted and an electric arc was formed, and the melted iron fell to the street. After several attempts to swing the girder into position, Mr. Stuart, the Engineer of Construction and Maintenance, who supervised the construction work, succeeded in locating the trouble. The insulation of one of the positive current feed wires of the Brooklyn City Railroad's trolley line, which were strung on one side of the elevated posts, had worn so that the live wire came in contact with and charged the structure. The negative current which completed the circuit, reached the iron work from underground, at a point on the other side of the unfinished section, and the contact between the two parts of the structure completed the circuit and caused the fusion. After diverting the course of the current by means of copper wire the work of completing the road progressed. As the columns of an elevated railroad structure are not built to serve as ground wires, and their conductivity for that purpose is an uncertain quantity, this incident shows that dangers of unknown magnitude must be looked out for, whenever one is in the vicinity of such powerful currents.

Once in a while we hear of an elevated station taking fire from the trolley lines. This sometimes occurs in a way similar to the incident related above. On other occasions the fire has originated from the circuit caused by the shifting of the trolley of a passing car. So far these fires have been, in most cases, easily extinguished with a bucket of water, and the damage done has been slight.

Although in many other ways (such as the corroding of foundation bolts, water pipes used for supplying stations, and angle bars attached to the transverse girders, etc.), the escape from electric currents of the trolley roads has proved damaging to the elevated structure, it has also benefited them by saving the amount necessary to maintain batteries for operating the telegraph lines over the roads. The Brooklyn Elevated Railroad uses nothing but a borrowed current for operating its telegraph wires. This is accomplished in most cases by running a wire into the ground and connecting it with a gas or water pipe, which readily appropriates a sufficient current from the street car line. But the Brooklyn Heights surface road (which controls more than 200 miles of single track trolley lines in Brooklyn) is fast paralleling its feed wires by equally heavy return wires so that the elevated road officials who, but for this, might successfully plan to light the stations and even operate the road as they run their telegraph, will probably have to fall back on their own resources. In time the officers of the elevated roads will probably regret (if they have not already done so) that they allowed the trolley lines to connect their wires with the structure. Great damage is being done to the large bolts used in the foundation work on which the iron pillars rest. These bolts will need constant watching, as those corroded will have to be replaced by new ones in order to maintain the strength of the structure.

South American Notes.

The report of the Buenos Ayres & Rosario Railway for 1893 shows gross earnings of \$2,833,380 on 903 miles of track, being an increase of \$189,540 over the preceding year. The operating expenses were \$1,472,580, thus leaving net receipts of \$1,360,800. The principal increase has been in freight traffic, the wheat carried having increased 71,800 tons, or 50 per cent.

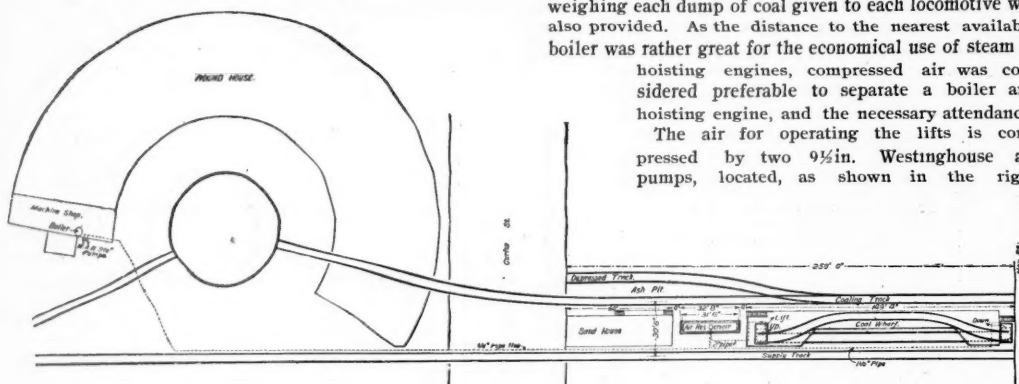


Fig. 1—General Plan.

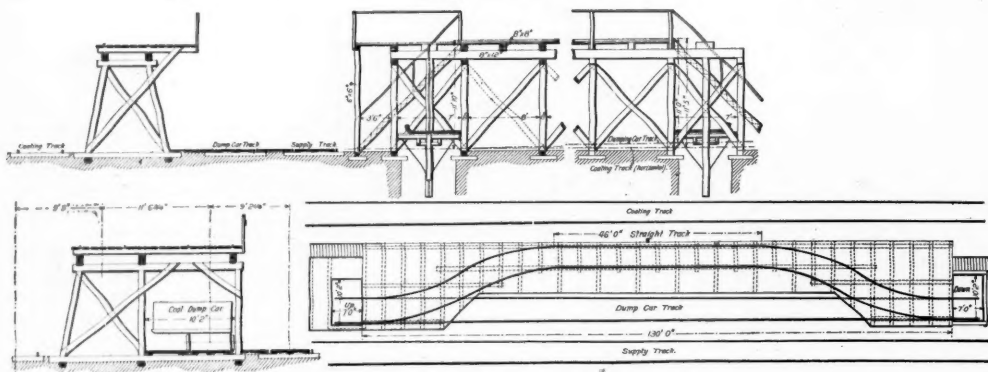


Fig. 2—Plan of Track and Section of Trestle.

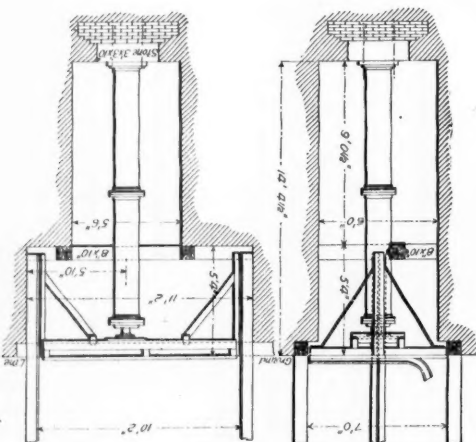


Fig. 3—Pit for Air Hoist.

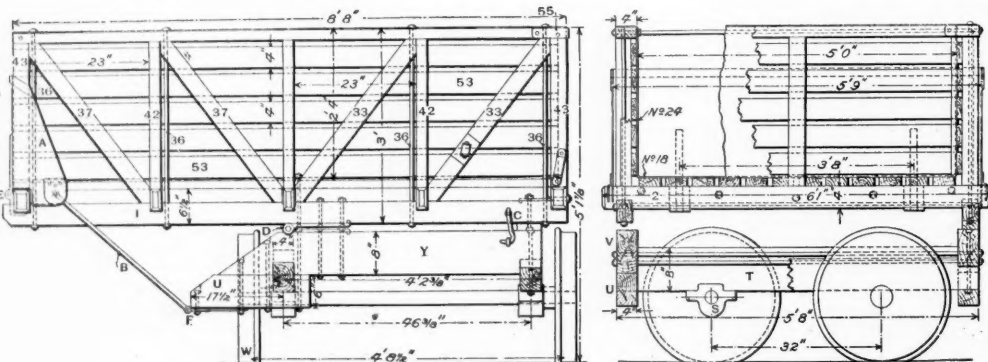


Fig. 4—Dump Car.

COALING WHARF OF THE PITTSBURGH, CINCINNATI, CHICAGO & ST. LOUIS RAILROAD, AT CHICAGO.

satisfactory coaling station may be erected and operated. For drawings and information concerning the plant we are indebted to Mr. S. P. Bush, Superintendent of Motive Power of the Southwest system of the Pennsylvania Lines West of Pittsburgh. The station is located at the Chicago round house of the Pittsburgh, Cincinnati, Chicago & St. Louis Railway.

In Fig. 1 are shown the relative positions of air pumps,

trestle, as shown in the illustration. Air is admitted by means of the three-way cock, below the piston in the cylinder of the lift and the car is raised. When half way up the flow of air is checked, the elevator stopped and the load weighed. For the purpose of weighing, a pressure gage, located in front of the operator, is connected with the hoisting cylinder, and a reference table, which is provided, gives the weight of the load corresponding to the

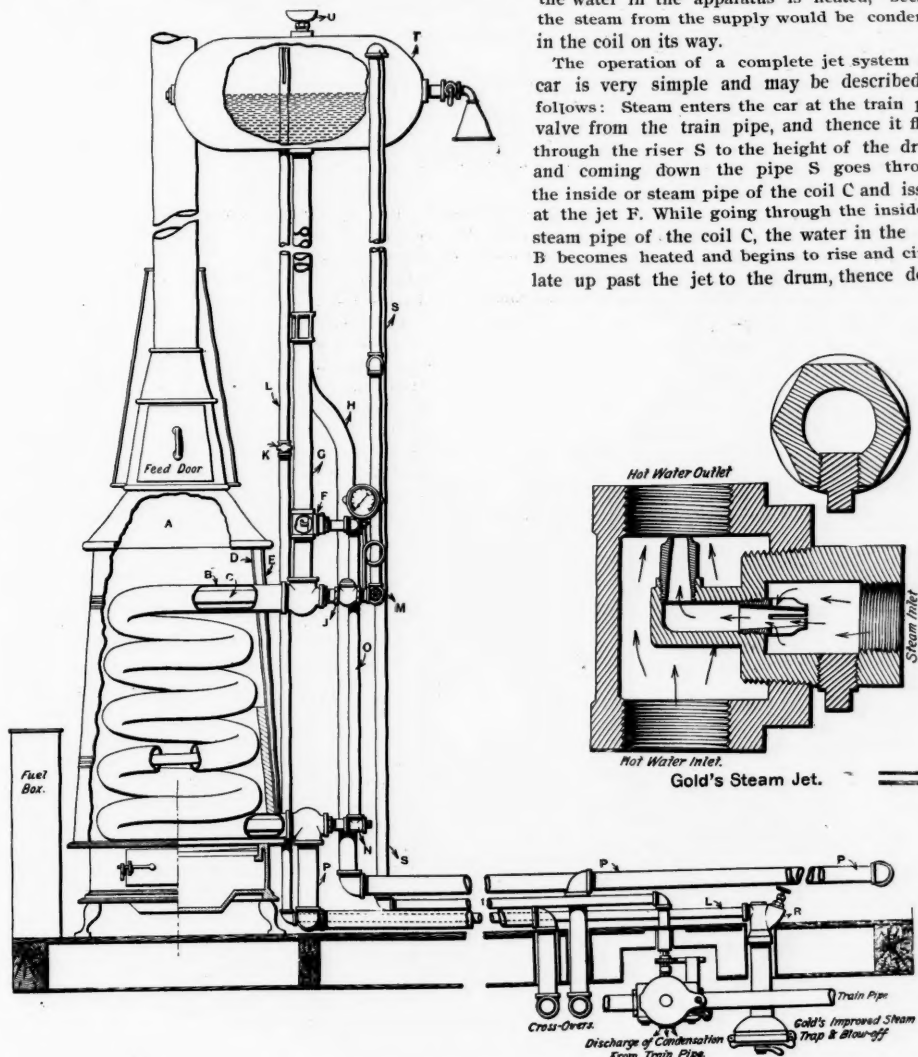
Gold's Jet System of Hot Water Circulation.

A jet system is, possibly, taking everything together, the best way to get rapid circulation for hot water heating; but the difficulty of procuring a jet which would act reliably, and at the same time be noiseless in working, has been considerable. Mr. Edward E. Gold has invented a jet apparatus, shown herewith, which is not only ingenious but has done well in practice. It was recently applied to 25 cars on the Chicago & Erie, and in each car a complete circulation was easily obtained with 20 pounds steam pressure, in less than five minutes.

As shown in the engraving, the jet is composed of a Tee fitting, into the side outlet of which is screwed a reducing coupling with the jet attached. The inlet of the jet is conical, with the vertex of the cone split and reversed so that any pipe scale or sediment which might find its way to the jet, cannot stop the flow of steam. The reduc-

This apparatus is said to be absolutely noiseless in operation. To realize this, the inventor uses the following method: First, the steam supply pipe is given a rise to the height of the drum, and thence downward, to accumulate by condensation an amount of hot water in the supply pipe. This rise in the supply pipe also prevents a back pressure of the water in the coil and drum. Secondly, this hot water and steam, passing, as it does, through the inside or steam coil, condenses and warms the water before any steam issues at the jet, and this warm or heated water rises to the height of the jet, and is either syphoned or forced through the pipe, and the steam from the jet intermingles then with only heated water, and by first issuing forth from the jet the water of condensation accumulated in the riser and coil and following it up with steam, and this obviates the noise referred to above, as warm water and steam commingle noiselessly. It is obvious that scarcely any steam can issue from the jet until all the water in the apparatus is heated, because the steam from the supply would be condensed in the coil on its way.

The operation of a complete jet system in a car is very simple and may be described as follows: Steam enters the car at the train pipe valve from the train pipe, and thence it flows through the riser S to the height of the drum, and coming down the pipe S goes through the inside or steam pipe of the coil C and issues at the jet F. While going through the inside or steam pipe of the coil C, the water in the coil B becomes heated and begins to rise and circulate up past the jet to the drum, thence down

**Gold's Double Coil Jet System.**

A Baker Stove.
B Hot Water.
C Steam Coil.
D Inside Wrought Iron Casing.
E Outside Russian Iron Casing.
F Steam Jet.
G Hot Water Column to Drum.
H Hot Water Column to Radiator.
J Horizontal Check Valve.
K Asbestos Cock, to be closed when fire is used.

L Pipe to Trap.
M Angle Valve.
N Tee and Plug.
O Steam Supply to Jet.
P Hot Water Return.
Q Hot Water Radiator.
R Gold's Improved Trap and Blow-off.
S Steam Supply Pipe.
T Expansion Drum.
U Safety Valve.

ing coupling is tapped on the lower side and a plug inserted. The outlet of the jet is also conical, giving the steam an expansive flow and drawing the water from the coil up to the drum when steam is turned on, and thence down the return pipe; or should the water be as high in the pipes as the overflow in the drum, it then starts the circulation by forcing the water through the pipes.

As the steam issuing from the jet keeps condensing, the water in the drum begins to rise, but to have an easy circulation it is essential to have the drum at all times about half full of water, and an overflow pipe is connected with the drum as shown in the cut, which relieves the pipes of the superfluous water resulting from the condensed steam. This overflow pipe, which penetrates the drum, is split at the top, the bottom of this slit being about one inch above the water level, so that should the water in the drum boil it will not discharge through the overflow. The overflow pipe is connected directly with the automatic trap, the principle of which is to allow the overflowed water, which is necessarily cold, to escape, but when all the overflow water has left the pipe, the steam from the jet closes the trap and the apparatus is thoroughly automatic.

In case a fire is used in the stove, steam not being convenient, the jet apparatus may be cut out by closing an angle valve on the steam supply pipe and an asbestos cock on the overflow pipe.

the return or radiator pipe H, which runs along the inside of the car, crosses over below the floor and returns on the opposite side of the car through the pipe Q, and through the coil to again repeat the journey around the car.

When the jet has issued so much steam that the condensation therefrom rises in the drum, the overflow pipe L carries the superfluous water to the trap, the water R becoming cold en route, thus opening the trap and discharging itself. After this water is discharged the steam from the jet closes the trap.

When a fire is used in the stove, the steam supply valve M is closed, as is also the asbestos cock K on the overflow pipe L. The hot water circulates as before, and the water, in passing the jet cannot back down through it because of a horizontal check valve J on the steam supply pipe S.

The engraving illustrates the apparatus using a single double coil, but a duplex double coil can be used with this system in the same manner, and, of course, will operate still more advantageously, for when using the duplex double coil each side of the car is heated separately, but the duplex double coil is only used on cars having an exceedingly large amount of radiating surface.

Rail Joints on the Memphis Bridge.

On the Memphis Bridge, in order to prevent wear and lost motion in the rail joints, Mr. Morison drilled the

angle bars with circular holes tightly fitting the bolts, while the circular holes in the webs of the rails are about one-quarter of an inch larger, his object being to render the two fish plates, with their bolts, as nearly as possible a single member, so that when sliding friction between the rail and that member takes place, as it must under changes of temperature, such friction shall be confined to the surface between the rail and this member, and shall not extend to the parts of the member itself. Mr. Morison writes that he has just walked over this track, which has now been in use for nearly two years, and that the bolts put in under that system all seem to be tight, while others put in since then and in the usual way, are almost invariably loose.—*Journal of the Association of Engineering Societies.*

Maintenance and Repair of Air Brakes.

At the May meeting of the New England Railroad Club, a short paper on the Maintenance and Repair of Air-Brakes was read by E. E. Chain, of the Boston & Albany Road. We give below a brief abstract of the paper and the discussion.

Mr. Chain said that it would be necessary to establish air-brake testing plants at terminal points, and along the line of each road, as well as in the shops. Then the men who have been schooled to the right way of testing cars, and making repairs, can do so with the least delay to traffic. He suggested that, as far as possible, all air-pipes be kept out of the ground so that drier air will be obtained.

At points where there are no boilers for furnishing steam to operate the air-pump, a car can be fitted up having a complete outfit for furnishing air, and tools to make all necessary repairs, together with a supply of material.

The car should be constructed so that it could be used for light switching work, and thus often save time in waiting for a switching engine. It could also be used by being taken to tracks and yards outside the terminal points, where cars may be stored after unloading, and where there may not be sufficient repair work to make it necessary to go to the expense of putting in a stationary plant to do this work.

He said that several forms of air-brake defect cards had been suggested, which would be very good if the men were familiar with the different parts of the brakes, but they would prove failures with trainmen. Mr. Chain's requirements for a defect card were that it should give the date and number of the train, number of the car, initials, and line, and where left, signed by the conductor of the train, with a space to report the nature of the defects and repairs necessary, together with the material used, and the time consumed in making such repairs, also the name of the person making the repairs. The card should be given to the agent at the place where the car is left, and if he could not make the repairs he should notify the air-brake inspector. If there is no agent where the car is left, the conductor should send the card to the air-brake inspector, and after the repairs are made it should be sent to the Master Car Builder, so that he could make the proper charges.

When railroad companies are willing to provide needed facilities for the proper repair of air-brakes on their cars, they will be able to do all the heavy repairs to their own cars, such as cleaning the triple valves, or replacing them with repaired ones when the slide valves leak, cleaning the cylinder and putting in new packing, which, if kept in good condition, will always insure good results from the use of the brakes.

The conductor of a train should be held responsible for hauling cars on his train which had not the air-brake hose hung up when it was not coupled up. Mr. Chain's experience with the clogging of the screens in the triple valves and drain cups, has been similar to that of Mr. Rhodes of the Chicago, Burlington & Quincy. He has designed a drain cup to avoid much of this trouble. It is constructed with a cast-iron shell running through the bottom of the bore of the cup, and about two-thirds of the circumference of the bore with the screen in the top, allowing plenty of space for the air to escape through the screen to the triple valve connection.

As a rule, cylinders are given too much oil, and, in consequence, become gummed. They should be oiled once in six months, and then given not more than a gill, and they should be taken apart and cleaned at least once a year. Every railroad should have its air-brake inspector, who should be thoroughly conversant with the workings of the air-brake and be capable of making any repairs to it.

In the discussion exception was taken to the statement that a shifting engine should be kept at junction points for adjusting air-brakes. Mr. Kolseth saying that a shifting engine would be inadequate, as it would always have something else to do, and that a stationary plant should be established.

He said that at the air-brake convention in Columbus an inspector said that a record had been made of all the cars coming to that point with the brakes cut out, and it was found that 90 per cent. of the brakes cut out were in working order. He told of another case, where a Westinghouse inspector had been called to examine a defective brake. On taking the cylinder apart he found it filled with gum, oil and dirt up to the center of the cylinder; and yet the stencil mark on the car was "cleaned and oiled" ten days before. There was another case in Boston, where Mr. Kolseth was called to locate some trouble with

a car, and found a freight triple valve on a passenger car, thus giving evidence of faulty inspection.

Mr. Adams, of the Boston & Albany, said that it is evident that a good many air-brakes are cut out and that no special care is taken of freight car train brakes. There are but one or two places where special inspection is made of train brakes. He said: "I suppose there is scarcely a road in the country that has, at any particular point, facilities for testing these brakes, except at the shops, and some large shops have no testing plant. I know of one of the largest railroad shops in the country that has not an air-pump. In every shop where cars are repaired, there should be suitable pumps and pipes, so that every air-braked car could be tested and put in first-class order before it leaves the shop. After the cars are upon the road they cease to be looked after very closely. The New York Central road has a plant to test brakes, and this plant at East Buffalo is very thorough and complete. The time has not arrived when railroad officers are sufficiently impressed with the necessity of the air-brake to get the most out of it. I think they must come to that before they will succeed in getting the advantage that should be obtained from the outlay of \$50 a car for this special service.

Present Practice in Specified Loadings for Railroad Bridges.

BY WARD BALDWIN, MEM. AM. SOC. C. E.

The list of loadings given in Table I, has been compiled from bridge specifications that were in force in 1893. The writer secured copies of these specifications in response to a circular letter of request sent to every railroad engineer whose name was given in Poor's Manual of 1893. It is believed that this list comprises nearly all of the bridge loadings to be found in railroad bridge speci-

Ninety-five independent railroad systems are represented in this list. Among those 95 railroads, 10 specify some kind of uniform load, with, in some cases, additional excess loads. Among the 85 remaining railroads—

- 71 specify only one kind of loading.
- 10 specify two kinds of loading.
- 4 specify three kinds of loading.
- 82 specify a loading made up wholly or in part of consolidation engines.
- 12 specify a loading made up wholly or in part of passenger engines.
- 5 specify a loading made up wholly or in part of decapod engines.
- 3 specify a loading made up wholly or in part of ten-wheel engines.
- 1 specifies a loading made up in part of mogul engines.
- 3 requires a uniform load to precede as well as follow the engines.
- 82 do not require any load to precede the engines.

Among the 82 railroads that specify a loading made up wholly or in part of consolidation engines—

- 4 vary the weights on the drivers.
- 78 do not vary the weights on the drivers.
- 9 vary the weights on the tender wheels.
- 73 do not vary the weights on the tender wheels.
- 77 specify two consolidation engines and a uniform load.
- 3 specify a train of consolidation engines.
- 1 specifies two consolidation engines and wheel loads for train.
- 1 specifies the 4 driver-loads of a consolidation engine, and a uniform load.

In the above enumeration, the E. & T. H. R. R. and the P. & R. F. R. R. are each counted twice, because they specify two loadings, each consisting of two consolidation engines and a uniform load.

The 77 railroads that specify loadings of two consolidation engines and a uniform load, have altogether 38 different loadings. Of these—

- 27 are each used by 1 railroad.
- 4 " " 2 railroads.
- 3 " " 3 " "

TABLE I.

W. & L. E. Ry.	1	15	97"	69"	54"	54"	85"	58"	68"	58"	108"	48"	2240
C. R. I. & P. R. R.	2	15	8.1'	5.7'	4.5'	4.5'	7'	4.1'	5.6'	4.1'	9'	2.5'	3500
F. Ft. W. & W. R. R.	3	15	7.5'	4.5'	4.5'	4.5'	10.5'	5'	5'	5'	8'	3'	3000
C. H. V. & T. Ry.		12	24	24	24	24	16	16	16	16	12	16	
H. & B. S. R. R.		15	97"	69"	54"	54"	85"	58"	68"	58"	108"	48"	3000
G. & H. R. R.	4	15	24	24	24	24	16	16	16	16	14	15	3000
E. & W. R. R. of A.		15	97"	69"	54"	54"	85"	58"	68"	58"	108"	48"	3000
P. Br. Co.		15	97"	69"	54"	54"	85"	58"	68"	58"	108"	48"	3000
C. & W. M. Ry.		15	97"	69"	54"	54"	85"	58"	68"	58"	108"	48"	3000
N. & H. S. Ry.		15	97"	69"	54"	54"	85"	58"	68"	58"	108"	48"	3000
F. & P. M. R. R.		15	97"	69"	54"	54"	85"	58"	68"	58"	108"	48"	3000
L. V. R. R.		15	97"	69"	54"	54"	85"	58"	68"	58"	108"	48"	3000
T. A. A. & N. M. Ry.		15	97"	69"	54"	54"	85"	58"	68"	58"	108"	48"	3000
T. & O. C. Ry.		15	97"	69"	54"	54"	85"	58"	68"	58"	108"	48"	3000
W. Ry. of A.	5	14.56'	8.2'	5.8'	4.5'	4.5'	7.5'	15.08'	5'	5'	15.08'	8'	3000
N. Y. O. & W. Ry.	6	16	90"	58"	52"	58"	132"	62"	64"	62"	91"	Train of Engines.	3000
K. C. & I. A. L.	7	16	8'	4.5'	4.5'	4.5'	9'	5'	5'	5'	7'	2d ENGINE.	3000
M. P. Ry.		16	8'	4.5'	4.5'	4.5'	9'	5'	5'	5'	7'	2d ENGINE.	3000
K. C. O. & S. R. R.		16	8'	4.5'	4.5'	4.5'	9'	5'	5'	5'	7'	2d ENGINE.	3000
E. & T. H. R. R.	8	17.6	8'	6'	4.5'	4.5'	8'	17.6	5'	5'	17.6	8'	3500
E. T. V. & G. R. R.	9	15.6	7'-4"	4'-10"	4'-4"	4'-10"	11'-11 1/2"	4'-4"	6'-4"	4'-4"	10'-9"	" "	4000
D. & R. G. R. R.	10	20	8'	4.5'	4.5'	4.5'	10'	5'	5'	5'	7.5'	" "	3000
C. S. Ry.	11	15	8'	5.5'	4.5'	4.5'	9'	4'	6'	4'	8'	" "	3000
B. C. R. O. & N. Ry.		15	8'	5'	5'	5'	11'	5'	5'	5'	8'	" "	3500
C. G. W. Ry.		15	8'	5'	5'	5'	11'	5'	5'	5'	8'	" "	3500
C. H. & D. Ry.		15	8'	5'	5'	5'	11'	5'	5'	5'	8'	" "	3500
C. & M. Ry.		15	8'	5'	5'	5'	11'	5'	5'	5'	8'	" "	3500
P. C. & P. R. R.		15	8'	5'	5'	5'	11'	5'	5'	5'	8'	" "	3500
G. M. & G. R. R.		15	8'	5'	5'	5'	11'	5'	5'	5'	8'	" "	3500
K. C. F. S. & M. R. R.		15	8'	5'	5'	5'	11'	5'	5'	5'	8'	" "	3500
M. C. R. R.		15	8'	5'	5'	5'	11'	5'	5'	5'	8'	" "	3500
M. L. S. & W. Ry.	12	16	97"	69"	54"	54"	85"	58"	68"	58"	108"	48"	3000
P. S. & L. E. R. R.		16	97"	69"	54"	54"	85"	58"	68"	58"	108"	48"	3000
P. & R. F. Ry.		16	97"	69"	54"	54"	85"	58"	68"	58"	108"	48"	3000
St. L. M. Br. Co.		16	97"	69"	54"	54"	85"	58"	68"	58"	108"	48"	3000
St. L. S. Ry.		16	97"	69"	54"	54"	85"	58"	68"	58"	108"	48"	3000
T. R. R. A. of St. L.		16	97"	69"	54"	54"	85"	58"	68"	58"	108"	48"	3000
S. C. & P. R. R.		16	97"	69"	54"	54"	85"	58"	68"	58"	108"	48"	3000
S. & N. R. R.		16	97"	69"	54"	54"	85"	58"	68"	58"	108"	48"	3000
C. St. P. M. & O. Ry.	13	15.5	8'	5'	5'	5'	11'	5'	5'	5'	8'	" "	3500
S. A. L.	14	12	8'	5'	5'	5'	7'	5'	5'	5'	9'	" "	4000
O. C. R. R.	15	16	8'	4'-11"	4'-11"	4'-11"	9'	4'-6"	5'	4'-6"	8'	" "	4000
P. L. W. of P.	16	15	7'-10"	4'-8"	4'-4"	4'-8"	10.9'	4'-9"	5'-10"	4'-9"	8'-6"	" "	4000
G. R. & I. R. R.		15	7'-10"	4'-8"	4'-4"	4'-8"	10.9'	4'-9"	5'-10"	4'-9"	8'-6"	" "	4000
P. R. R.	17	16	8'	4'-6"	4'-6"	4'-6"	11'-6"	5'	5'-6"	5'	8'	" "	4000
C. F. & V. V. R. R.		16	8'	4'-6"	4'-6"	4'-6"	11'-6"	5'	5'-6"	5'	8'	" "	4000
G. C. & C. R. R.		16	8'	4'-6"	4'-6"	4'-6"	11'-6"	5'	5'-6"	5'	8'	" "	4000
M. T. & M. R. R.		16	8'	4'-6"	4'-6"	4'-6"	11'-6"	5'	5'-6"	5'	8'	" "	4000
G. C. & N. Ry.	18	14	7'	5'	5'	5'	10'	5'	5'	5'	8'	" "	4000
C. & A. R. R.	19	14	7'	5'	5'	5'	10'	5'	5'	5'	8'	" "	4000
L. S. & M. S. R. R.	20	14	7'	5'	5'	5'	10'	5'	5'	5'	8'	" "	4000
C. & O. R. R.	21	17	7'-8"	4'-10"	4'-4"	4'-10"	11'-6 1/2"	5'	4'-10"	5'	9'-5"	3'-5"	4000
N. N. & M. V. R. R.		17	7'-8"	4'-10"	4'-4"	4'-10"	11'-6 1/2"	5'	4'-10"	5'	9'-5"	3'-5"	4000
B. R. & P. Ry.	22	16	7'-5"	5'	4'	5'	10'-6"	4'-8"	5'-3"	4'-8"	8'-5"	3'	4000

fictions in the United States, and that it is, therefore, sufficiently comprehensive to afford a fair basis for a study of present practice in regard to such loading.

2 are each used by 4 railroads (Cooper's "Lehigh Valley" and P. R. R. specifications).
1 is used by 9 railroads (Cooper's Class "A").
1 " " 16 " (Cooper's Extra Heavy "A").

These figures make it clear that the only loadings that have as yet been at all generally adopted are those given in Mr. Cooper's bridge specifications.

Of these same 77 railroads—

- 1 requires a 22,000-lb. driver load with a 2,240-lb. uniform load.
- 1 " 23,000 " " 3,500 " " "
- 12 " 24,000 " " 3,000 " " "
- 1 " 24,640 " " 3,000 " " "
- 3 " 28,000 " " 3,000 " " "
- 1 " 28,000 " " 3,500 " " "
- 1 " 28,600 " " 4,000 " " "
- 18 " 30,000 " " 3,000 " " "
- 1 " 30,000 " " 3,500 " " "
- 14 " 30,000 " " 4,000 " " "
- 1 " 30,000 " " 4,200 " " "
- 1 " 31,000 " " 4,000 " " "
- 2 " 32,000 " " 3,600 " " "
- 1 " 32,500 " " 2,500 " " "
- 1 " 34,000 " " 2,000 " " "
- 1 " 35,000 " " 2,500 " " "
- 4 " 35,000 " " 4,000 " " "
- 1 " 36,000 " " 4,000 " " "
- 2 " { average } " " 4,000 " " "
- 6 " { 37,000 } " " 4,000 " " "
- 1 " 40,000 " " 4,000 " " "
- 1 " 44,000 " " 3,200 " " "
- 1 " { average } " " 3,000 " " "
- 2 " { 36,600 } " " 4,200 " " "
- Also—
- 1 specifies a uniform load of 2,240 lbs. per ft.
- 37 " " " 3,000 " " "
- 1 " " " 3,200 " " "
- 1 " " " 3,500 " " "
- 6 " " " 3,600 " " "
- 29 " " " 4,000 " " "
- 2 " " " 4,200 " " "

It is apparent that the great diversity of loadings is due to differences in the engine loadings. Thus there are only 7 different uniform loads in Table I, while there are 52 different engine loadings. A casual examination of the loadings is sufficient to make it clear that the differences between many of the engines are so slight that they could be made concordant without any sacrifice of accuracy. A more careful study will show that apparently greater differences may also be eliminated. It is proposed to determine, by means of a comparison of the curves, representing graphically each engine load, how far it is possible to observe uniform practice in specifying engine loadings, and still use loadings that give substantially the same stresses as those now specified.

In Table I the wheel weights are expressed in units of 1,000 lbs., and the loads are expressed in pounds per linear foot.

This table was published by the writer in a slightly different form in the December number of the *Transactions* of the American Society of Civil Engineers.

Right of a Receiver to Manage Details.

Some good specimens of sensible railroad law appear in a decision given by Judge Hanford, in the United States District Court at Seattle, Wash., recently, in the petition of certain discharged conductors of the Seattle, Lake Shore & Eastern Railroad, to have their cases submitted to a joint board, as had been provided for under the agreement of the employees of this road with the Northern Pacific, when the latter company was in control of the line. Soon after the present Receiver, Thomas R. Brown, took charge of the road, he ordered the discharge of a number of passenger conductors who had been reported to him as dishonest, and one of the number asked the court to order the Receiver to give a reason for the discharge, and to submit the case to a Board, consisting of the Superintendent and three members of the class of employees to which the discharged men belonged. Judge Hanford holds that the alleged contract between the railroad company and the employees is not binding on the Receiver, at least so far as regards the question at issue; and in deciding that the men have no remedy, he says, among other things:

"The nature of a Receiver's responsibilities makes it absolutely necessary that he should exercise discretion in the selection of conductors and engineers and all who occupy judiciary positions under him. Any rule or contract binding him to continue in such positions persons with whom he is unable to maintain cordial relations or repose confidence, is incompatible with the freedom necessary to the proper exercise of his discretion and performance of his duty. It would certainly be unreasonable to hold him responsible for the conduct of an employee kept in position by a decision of four arbitrators, three of them being such person's fellow servants. A contract to that effect, if intentionally made by a receiver, would be void, because it would necessarily deprive the receiver of an important part of the power vested in him by the order of his appointment. A receiver cannot lawfully thus restrict himself in the exercise of his powers. No legal claim for damages can be predicated upon the mere failure to keep a promise on the part of the employer to not discharge an employee without cause, or to submit to any question as to the existence or non-existence of sufficient cause, to arbitration, much less can a court specifically enforce such an agreement.

"It is impossible for the court to actively manage the details of a railway corporation's business, except through a general agent. A receiver, as such agent, therefore, occupies the position and has the rights of an employer, although the men operating the railway under him are, in a certain sense, employees of the court. It is impracticable for the court to give such attention to matters of detail as would be necessary to justify it in overruling a receiver in the matter of selecting or discharging his subordinates. Only in matters of general policy can the court give directions to a receiver. Grievances of his subordinates will receive attention in all matters affecting the general policy of the business intrusted to him, and whenever they amount to an accusation against the receiver of sufficient gravity to justify his dismissal. The remedy proper in case of an abuse of power in such matters is removal of the receiver from office."

"Counsel for the petitioners, in his argument, has vigorously and earnestly denounced the action of Receiver Brown in discharging the petitioner, Corcoran, as oppressive and abusive. It has never been regarded as an act of

*Continental Trust Co., vs Toledo, St. L. & K. C. R. R. Co. 59 Fed. Rep. 514.



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EDITORIAL ANNOUNCEMENT.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

The office of the Railroad Gazette is now at 32 PARK PLACE, New York.

Railroad discipline is not weak in many features, but it is relatively weak in one feature, inspection. Our statement of this fact, in the issue of May 11, quoting the President of the American Railway Association in support of our view, is taken up and discussed by a correspondent, "A. J. L.," whose letter we print in another column of this issue. The criticism of railroad journals, which the letter offers, that they do not give enough attention to the details of good railroad discipline, is answered, we think, by the critic himself. We deplore the fact that "the system follows the man"—that when an officer leaves a railroad he carries off certain details of good discipline; and for that very reason, that the machine is good for nothing without its originator to attend to it, we find it difficult to discuss the machine. Perhaps we ought to say that the machine is pretty good already. At all events we never preach improvement, but every superintendent we meet tells us that he knows it all now. And this is doubtless a fairly just answer. In other words, nearly every superintendent knows well enough what good discipline is, and he will carry it out just as soon as he feels sure enough of his own position to give him the requisite degree of independence, and he gets the directors' approval of the diminution of profits which is likely to ensue when he provides service a little safer and better than the public is willing to pay for. As good discipline depends, therefore, on the right kind of a man, one who can improve the service either without increasing expenditures or without letting the directors know that he increases them, we wish to commend every such man that we can find. Our correspondent ought to give the name of the manager whom he speaks of.

The last instalment of the report of the recent convention of the Air-brake Men's Association appears in another column of this issue. This is the youngest of our railroad associations, and if we may judge by the proceedings, it is one of the most business-like. The papers presented by the various committees were well written, and, if we may use the term, were well edited. That is, they were unusually free from repetitions and irrelevant matter. And in the discussions, too, there was a definiteness often wanting in the other and older societies. While the papers were all good, special mention should be made of those on Handling Trains and on How to Instruct. These subjects have been much less discussed than the others, while at the same time they affect a much larger class of men. Every trainman should read the former; not on the assumption that he does not already know how a train should be handled on hog backs, in sags and at other places, but to clear up his knowledge. For a similar reason superintendents will want to read the report on instruction, if they have not already done so. Many a good air-brake expert is not proficient in the art of giving instruction, and this paper will give superintendents numerous hints that will enable them to see if the business of instruction on their respective roads is in the hands of competent men. Perhaps the most valuable result of the discussions in this Association will

be to emphasize the fact that the handling of trains and of air-brake apparatus is the joint business of the engineer and the trainmen, and that the coupling at the rear of the tender is not a dividing line beyond which neither side need give a thought. The use of air-brakes makes the work of the brakemen much less than before, but the complexity of their responsibilities is no less.

The Western presidents have taken a radical step in taking away from their subordinates the power to reduce rates, and agreeing to keep it in their own hands. This practically amounts to a withdrawal of the rate-making power from the hands of the traffic men, for no one can remember when these officials ever advanced rates of their own motion. Ex-Chairman Walker and others have long advocated such a policy as that now resolved upon, and the result of this action may be very important. An important item in the agreement (which we print on another page), is that binding the roads not to make any time contracts which will prevent an advance in rates at any time on ten days' notice. This alone will suffice to test the cohesiveness of the agreement, and if it stands the stress of such severe competition as that which has prevailed for the last eight months, it will be an important point gained; for the one outstanding long-time contract, disclosed at the last moment by the most reckless road, has probably brought to nought a larger number of weary days' negotiations for a tariff restoration than any other one thing. The experiment of maintaining rates by diversion of freight is again to be tried, if found necessary, but no agreement is attempted as to the proportions which each line shall be entitled to, this being left in the hands of each Commissioner. It is to be hoped that no occasion will arise for using this resource without an agreement in advance by the presidents themselves to abide by arbitration as to the exact proportions each line shall be entitled to; otherwise we very much fear that the agreement will at once become "jeopardized." No attempt was made to provide a penalty for violation of the agreement, which rests, as has its predecessors, upon the personal pledge of each member. It is quite possible, however, that the situation has become so desperate that no president will be willing for some time to come to take the responsibility of bringing on another war. In 1891, and again in 1892, a reasonable degree of peace was maintained by these roads for a long time, and so far as an outsider could see, it was simply because each president decided that it was better to stop the source of reports that disturbed Wall street, than to fight for his due share of the traffic—even if he won the fight. Similar conditions exist now. As to whether it will be permanently practicable for the presidents to do their own work, and that of the traffic managers also, we must wait and see.

The Metropolitan Railroads of New York and London.

In our issue of May 18 we said that the Manhattan Railway System of New York city earned in 1892 \$300,000 a mile, while the Metropolitan and Metropolitan District Systems of London earned but \$73,000 a mile, and promised to consider some of the conditions which caused this great difference. It may be that a careful study of these conditions will be valuable to those engineers and business men who will determine, sooner or later, the kind and location of rapid transit railroads to be built in various cities of the United States. We said in our former article that the gross earnings depend upon the adjustment of the railroad to the wants of the public, and this includes, among other things, the geographical situation, the speed and frequency of trains, the rates of fare, the attractiveness and accessibility of the means of conveyance and the efficiency of the competition which is met.

Let us consider first the actual capacity of the railroads of New York and London to carry passengers in one direction from one typical station in the crowded district. The elevated railroad train has five cars, each seating 48 persons. The train capacity is 240 seated, or 500 seated and standing. The trains of the Metropolitan and Metropolitan District have nine carriages, namely, two first-class, three second-class, and four third, the total seats being 430, and the total capacity sitting and standing, say 640. In the busiest hours trains pass Rector street, going north by Sixth avenue, at intervals of two minutes, which gives an average capacity of 7,000 passengers an hour seated, or 15,000 seated and standing. In the busiest time of day trains pass the Mansion House Station, London, west bound, at intervals of three minutes, and

could carry 8,600 passengers an hour seated, and 12,800 seated and standing.

In neither case do all of these trains run the whole length of the road, but they all run $4\frac{1}{4}$ miles north from Rector street, and $4\frac{1}{2}$ miles west from the Mansion House. For these distances the carrying capacity of the present service is practically equal, although the seating capacity is greater on the London road. But if one goes only one block west from Rector street he will reach the Ninth avenue line, which increases the possible service at least 75 per cent. We are not considering now the Third avenue line and the Second avenue line, New York, or the Metropolitan in London; but merely the capacity of the two systems to get passengers away from one typical station in each city.

A vital point in any system of city railroad service is the frequency of trains, for when one is seeking to go from one quarter of the city to another his choice of public conveyance will be governed by the sum of several elements, and not by any one of them taken alone. That is, he considers the distance that he has to go, the speed of each conveyance, the frequency (which, of course, affects the time that he may have to wait) and the distance from his starting point to the nearest place where he can take the conveyance. The route which gives the most favorable result from the combination of these elements, is the one that he will take, unless there is a considerable difference in rates of fare; or, sometimes, in attractiveness, although the latter element is probably of minor importance in the majority of cases. Considering then, the frequency element alone, and taking again Rector street in New York and Mansion House Station in London, we find going north from Rector street as far as Fiftieth street, that is, 4.27 miles, a train every two minutes in the busy hours, and between the hours of 11 and 1 a train every three minutes. Passing the Mansion House Station going west as far as Gloucester Road, being $4\frac{1}{2}$ miles, a train may be taken every three minutes in the busiest hours.

The interval is materially shorter in New York; but if one wishes to start from Franklin street, less than a mile further north, he can get a train every $1\frac{1}{2}$ minutes, or twice as often as in London.

These are for short distances only; that is, four to five miles. For passengers wishing to go longer distances the advantages are still greater in New York. One who wishes to go to 135th street, $9\frac{3}{4}$ miles, can take a train from Rector street by the Sixth avenue every two or three minutes, (the interval varies) or he can walk one block and get a train on the Ninth avenue every five minutes. If he wishes to go from the Mansion House to Richmond, $10\frac{3}{4}$ miles, he can get a train every half hour in the busy hours of the afternoon. To Ealing and to Wimbledon, practically the same distances, he can also get half-hourly trains. That is, for distances beyond five miles the New York service is so much more frequent as not to be compared at all. It is an entirely different service, based on a different theory. The London service for these longer distances ceases to be what is now understood as city "rapid transit."

In this we have not considered at all the 14 express trains which pass Rector St. on the Ninth avenue line between 3 and 6 p.m.

Frequency of stations is almost as important as frequency of trains, and in this, too, the New York railroads give far more service than those of London. From South Ferry to 50th street, on the Sixth avenue line, in 4.78 miles there are 16 stations, or more than one to every 0.3 mile on an average, and from South Ferry to 155th street, 10.76 miles, there are 28 stations, averaging one to every 0.38 mile. On the Metropolitan District, beginning at Aldgate, four stations east of the Mansion House, so as to include the shortest intervals between stations, we find that the stations from there to Kensington High street, 6.1 miles, average one to 0.43 mile. That is, where the stations are most frequent they average fewer to the mile than on the whole length of the Manhattan line from the Battery to the northern terminus at the Harlem. Beyond Kensington the average distance between stations increases rapidly. Going to Ealing it is 0.6 mile, to Richmond it is 0.75 mile.

Let us examine now the speed of trains in the two cities. From Rector street to 50th, 4.27 miles, a passenger can go in 22 minutes, that is at 11.7 miles an hour, including 13 intermediate stops. From Rector to 155th he can go 10.76 miles in 48 minutes, the inclusive speed being 13.45 miles an hour, including 25 intermediate stops. On the Third avenue line he can go from Hanover square to 42d street, 3.72 miles, in 21 minutes, being 10.62 miles an hour, with 12 intermediate stops; or he can go to 129th street, 8.1 miles, in 41 minutes, being 11.8 miles an hour with 24 inter-

mediate stops. From the Mansion House to Kensington High street, 5.2 miles, the average speed is 10.8 miles an hour, including 9 intermediate stops. From Mansion House to Richmond, 10.75 miles, the speed is 12.9 miles an hour, including 15 stops. The inclusive speed on the London line is less than on the New York Sixth avenue line, but greater than on the Third avenue line, and the stops are much less frequent. A more convenient view of these facts is given by tabulating them.

	Miles an hour.	Stops.
Rector to 50th street	11.70	13
Hanover square to 42d street	10.62	12
Mansion House to Kensington High street	10.80	9
Rector to 155th street	13.45	25
Hanover square to 129th street	11.80	24
Mansion House to Richmond	12.90	15

The passenger speed depends not only upon the maximum speed between stations and the number of stops, but upon the length of stops made at stations, and here comes in a curious fact. We are taught that the side-door trains have an advantage in that they can be emptied and loaded quicker, and that therefore the station stops may be shortened. Careful observation of a great many stops on the underground railroads of London shows us that the average time from the full stop to start is about 30 seconds. The range from the shortest to the longest stop is considerable, but this is the average of a good many observations. On the elevated railroads of New York the average stop is between 12 and 15 seconds. Some authorities say 12, others 15. Just why it should be possible to get the passengers in and out of the end-door cars quicker than in and out of the side-door cars is hard to say; we simply record the fact. We will suggest, however, that for way stations, trains made up of carriages of several classes, with side doors, are almost sure, in the nature of things, to involve longer station stops. The passenger must look along the train for a carriage of his class. On the London underground roads one may see signs at various places along the station platforms, "Wait here for first class," or "Wait here for third class," but as trains from different roads run over the same tracks, they are not always made up in the same order; therefore the signs are only moderately useful in distributing the passengers; so more or less time is lost in looking for the class. Then, when a passenger has found a carriage of his class he will naturally look for a compartment that is not crowded, and if he can find one that is absolutely empty he will prefer that. These, we take it, are the chief reasons why the stops on the underground are longer than on the elevated roads. Another reason that suggests itself is that there are many more doors for the guards to close; but so far as we have observed it seems to be the practice for the guards to start the trains before the doors are closed and to run alongside and fasten the doors after the trains are under way. At a terminal station, where great crowds are to be handled, the side door cars are, we should say, without any doubt the more convenient, but we question very much if they are more convenient for way stations.

On the whole, the superior speed on the New York railroads is largely a matter of smarter working. The underground roads ought to be able to make greater speeds, for they can use heavier engines and so get up to the maximum speed quicker; but on the other hand it is questionable if what they gain in this way will not be lost in the greater caution needed in working heavier trains and working them in tunnels. These elements necessitate absolute blocking, but on the elevated railroads of New York, worked in what is almost always a clear atmosphere, and with but few obstructions to a long sight ahead, the trains can be run safely at considerable speed without block signals. One train can run right up to the tail of another one, and thus take advantage of every second, and this suggests the inquiries whether or not it will be found advantageous to use block signals on an elevated railroad in our clear climate, and whether or not it will be found advantageous to much increase the weight of trains.

Still other elements of public accommodation on the Metropolitan systems of the two great cities remain to be considered in a third article in which we shall hope to summarize the facts presented in the whole series.

The Efficiency of Air and Foundation Brakes.

Last week a paper was discussed before the Western Railway Club on the "Efficiency of Air and Foundation Brakes," an abstract of which we gave on page 332. In reading this paper it should not be forgotten that the brake beam pressure now used in freight service, and which is produced by the standard train pipe pressure of 70 pounds, and the common arrangement of

brake gear, is all that it is safe to permit in that service until something like a standard brake shoe is reached. The friction of brake shoes made of different materials varies greatly, and the maximum allowable brake beam pressure for one kind of shoe may be much more than can be used, without sliding the wheels, with another kind of shoe. It is this wide difference between the maximum safe brake shoe pressures that the Master Car Builders' Association is now investigating, the subject having been referred to two committees, one on "shop tests," and one on "road tests" of brake shoes.

The paper before the Western Railway Club, calls attention to some of the losses of braking force; of these insufficient train pipe and reservoir pressure, excessive piston travel, insufficient leverage, brake shoes not applied to all wheels, the position of shoes and angle of brake beam hangers are matters that have been considered by the Master Car Builders' Association. Such losses are the result of errors in design, maintenance or method of use, that are more or less inexcusable and are generally the result of negligence or ignorance.

Three of the losses mentioned in the paper, viz.: friction of piston packing, resistance of the piston release spring in the cylinder, and the friction in the connections of the brake, do not increase the danger to trains, because, with a properly designed brake arrangement, made according to the recommendations in the various reports of the Master Car Builders' Association, these losses are all allowed for and sufficient braking power remains to give all the brake beam pressure that is safe to carry, as has been shown by actual experience; especially is this true when there is, as now, such a wide difference in the materials used for brake shoes.

The paper holds that "there is certainly no excuse for anything less than 90 per cent." for braking power, instead of the present accepted practice of 70 per cent. of the light weight of the car in freight service. This statement must be taken with reserve by those who wish to save trouble from wheels "slid flat," for the reason that it is only safe to use a braking power of 90 per cent of the light weight of the car, as is done in passenger equipment, when the best discipline is maintained in the handling of air-brakes and when there is something like uniformity in the material used for brake shoes.

The practical point of this paper is that in spite of the careful teaching and advice of the Master Car Builders' Association, there are those who still continue to put up brake apparatus contrary to fundamental theory and practical experience, and in doing this show ignorance of the investigations and recommendations of the practical railroad men who have served on the committees of the Association. It is important, although not brought out in the paper in question, that the observations and conclusions reached by the author do not in any way indicate that the standards of the Master Car Builders' Association are wrong in any particular, and it is as certain as before that the advice of the Association is safe to follow; those who do so will not be led into the construction of such inferior brake apparatus as has been brought to the attention of the Western Railway Club.

The Railroad Bond Market in May.

The market for railroad bonds during the month of May was fairly active, irregular and generally weak with a slight general advance toward the end of the month. The average decline was 0.45 per cent. against an average decline of 0.75 per cent. during the month of April. The significant declines were in the receivership, Southwestern and miscellaneous groups. The advances were inconsiderable as compared with the declines, amounting to 0.15 in the Grangers and 0.30 in the Trunk lines. The range of prices more nearly reflected the market for stocks than in April. The stock market has been on the downward swing; considerable stock was liquidated, as were also quite large holdings of the lower classes of bonds, and the investment demand fell to the minimum.

The great feature in the bond market was the movement in bonds of roads in the hands of receivers. The movement from 1st of January up to the last of April in these securities was upward. They were depressed during the panic and it was on that idea that they were freely bought in discount of reorganizations, which it was expected would place the burden of rehabilitation on the stockholders. Since that time the reorganization movement has had a setback through a drop in the general stock market, and a much greater decline in the stocks of roads in the hands of receivers. This is due, as was pointed out in our last issue, to the very drastic New England reorganization plan, which was published April 27. The indications are that if the precedent thus established is carried out the stocks and junior securities will be called upon to stand the brunt of the burden.

Following is given the average movement of prices of the various groups:

Roads in receivers' hands	declined	\$2.63
Grangers	advanced	.15
Trunk lines	advanced	.30
Southwestern	declined	1.32
Transcontinental	advanced	.25
Coalers	declined	.62
Southern	declined	.02
Miscellaneous	declined	.66
Average decline of the list45

The declines of 7 points in Atlantic & Pacific 4's, and in St. Louis & San Francisco issues of various amounts, ranging from 1½ to 4½ points were due to the belief that the reorganization of Atchison would scale interest on those issues. The senior securities of Atchison showed more strength. Thus the 4's advanced ½ per cent. on transactions of \$592,000, and the seconds lost a trifle less than the general average of the group, or 2 per cent. on transactions in \$1,183,000. The Erie 1st and 2nds were very weak, as is shown in the accompanying table, on the possibility that the reorganization plan may fail. They were not comparatively active. Northern Pacific issues scored further net decline this month. The consolidated 5's lost 1½ per cent. in May, and 5½ per cent. in April; the 1sts, 1½ and 3½; the 3ds, 4½ and 3½; the 2nds, 5½ and 5½; the Northern Pacific & Mont: 1sts, 7½ and ½; Wisconsin Central 1sts, 4 and 1½ respectively. One of the principal causes of this weakness was the receivers' report, covering the period from August 16 to March 31, showing that there were unpaid charges of \$3,606,149, including interest on all the seconds and all bonds under them. Continued bad earnings contributed to the weakness.

There was considerable liquidation in the various issues, and the whole amount of the transactions amounted to \$1,750,000. The 1sts had a sharp drop during the middle of the month on the belief that the interest would be defaulted. The decline was from 111½ to 106½. The subsequent rally to 110½ was on the official statement that money for the interest had been provided. The preferred stock of the company has ownership rights in certain lands East of the Missouri River, on the line of the Northern Pacific. If interest on the first mortgage is defaulted this ownership passes from the stock to the first mortgage. In view of this fact, it is thought that the preferred stockholders will see that the first mortgage gets its interest.

Reading issues were weak and there was some liquidation by owners who had grown tired of waiting for something to turn up. There was also considerable speculation. During the period under review some \$250,000 of the four issues were traded in.

The Granger group showed a decline of 0.15 per cent. against an advance of 0.98 per cent. last month. The movement reflected the rate war which has been going on the greater part of the month, and which was only settled last week. The issues of this group as a rule, have been strong since the first of the year, but now that rate difficulties are adjusted in a way that promises some degree of stability, the issues are stronger than they were earlier in the month. They are all high class bonds, and the decline does not reflect liquidation. Rock Island extension 5's lead in point of activity, about \$250,000 being traded in.

The Trunk lines in April advanced 1.30 per cent. The advance this month was 0.30 per cent. The last prices, as will be seen by the table, are somewhat below the highest prices of the month. This is due to the unfavorable turn which has occurred in the second half of the period under review in the matter of earnings.

The Southwestern group, with a decline of 1.32 per cent. and especially the Missouri, Pacific and Iron Mountain issues, reflected more or less liquidation, on continued bad earnings, and to some extent in the taking of a profit by speculative interests, who bought earlier in the year at lower prices.

The coal bonds, as a rule, were strong. They are a prime investment security and the improvement which has taken place in the hard coal situation in the month, owing to the soft coal strike, is undoubtedly reflected in prices.

The average of the miscellaneous bonds reflects the general movement of the entire list. Thus the decline was 0.66 per cent. against an average for the whole group of 0.45 per cent. The notable feature of this group, during May, was the advance of the industrial and street railroad issues and a decline in railroad issues. This is construed to mean that the industrial issues, being more remotely removed from speculative influences, possess more stability in a market that is to a marked degree professional and bearish. Consumers' Gas, of Chicago, with an advance of 2½ per cent., reflected the improvement in Chicago gas stocks. The General Electric debenture is advanced on the idea that the company's policy is to retire a portion of the debentures outstanding. Long Island 4½'s advanced in discount of Summer business. Third Avenue advanced on a heavy increase in earnings.

Following are the sales, par value, of the active bonds from May 1 to May 26, inclusive:

Atchisons 4's, \$592,000; Atchison 2nds, "A," \$1,183,000; Chicago, Burlington & Quincy 7's, \$246,000; Chesapeake & Ohio Con. 5's, \$129,000; Chicago & Northern Pacific 5's, \$269,000; Chicago Gas Light & Coke 5's, \$153,000; Chicago & East. Ill. gen. 5's, \$134,000; General Electric debenture 5's, \$796,000; Hocking Valley 5's, \$110,000; Illinois Central 4's, 1953, \$109,000; Kansas Pacific con. 6's, \$125,000; Kansas & Texas 4's, \$284,000; Kansas & Texas 2nds, \$527,000; Laclede Gas 5's, \$101,000; Mo. Kan. & East. 1sts, \$112,000; Manhattan Railway 4's, \$141,000; Mobile & Ohio gen. 4's, \$334,000; Northern Pacific 1sts, \$319,000; Northern Pacific 1st reg., \$475,000; Northern Pacific 2ds, \$202,000; Northern Pacific 3rds, \$212,000; Northern Pacific con. 5's, \$534,000; Nashville, Chattanooga & St. Louis con. 5's, \$285,000; N. Y., Chic. & St. Louis 4's, \$302,000; N. Y., Ontario & Western 4's, \$233,000; Oregon Short Line & U. N. con. 5's, \$130,000; Oregon Short Line 6's, \$160,000; Rich. & W. P. T. 5's, \$186,000; Rock Island ext. 5's, \$271,000; Reading 4's, \$1,394,000; Reading 1st incomes, \$681,000; 2nd incomes, \$474,000; 3rd incomes, \$481,000; Rio Grande Western 4's, \$241,000; St. Louis Southwestern 1sts, \$180,000; San Antonio & Arkansas Pass. 4's, \$184,000; Texas &

Pacific 1sts, \$317,000; Texas and Pacific 2nds, \$427,000; Union Elevated 1sts, \$289,000; Wabash 1sts, \$271,000; Wabash 2nds, \$138,000 and West Shore gold 4s, \$519,000.

Following is a table showing the range of prices for the month, inclusive of May 26:

	High.	Low.	Last Sale.	Change from 1st Sale in April.
Roads in Receivers' Hands.				
Atch., Top. & S. Fe 4s.	74½	72½	74½	+ ½
Atlantic & Pacific 4s.	50½	47	48	-1½
Colorado Midland 4s.	50½	44	45½	-7
St. Louis & San F. 2nds A.	109½	108½	109½	-¼
" " " " " B.	111	109½	109½	-3
" " " " " C.	110½	108½	109	-3½
" " " " " gen. 4s.	45	44½	45½	-4½
" " " " " 5s.	82	81	81	-1½
" " " " " 6s.	90½	93½	93½	-4½
East Tennessee 1sts.	99	97½	97½	-1½
Knoxville & Ohio 1sts.	108	107	107½	+ ¼
Eric 1sts, cons. gold.	136	135½	132½	-4½
" " " " " 2nds.	79	72	72	-7
Northern Pacific 1sts.	111½	106½	110½	-1½
" " " " " 2nds.	84	77	78½	-5½
" " " " " con. 5s.	29½	25½	27½	-1½
" " " " " 3rds.	60½	53½	55½	-4½
" " " " " Terminal.	101½	100	100	-1
Northern Pac. & Mon. 1sts.	32	30	30	-7½
Wisconsin Central 1sts.	74	71	71	-4
Chicago & Nor. Pac. 5s.	47	43½	44½	-1½
St. Paul & Nor. Pac. 1sts.	117	116	116	-1
Seattle, L. S. & Eastern 1sts.	50	48	50	-5
Cleveland & Canton 1sts.	75	75	75	-
L. Evans & St. Louis 1sts.	50	49½	49½	-½
Peoria, Dec. & Ryan. 1sts.	87	82	82	-3
Evansville Div.	27½	24	24	-3½
Peoria, Dec. & Evan. 2ds.	76	73½	75½	+ ½
Reading 4s.	31½	28½	29½	-1½
" " " " " 1st incomes.	22½	18½	20½	-2½
" " " " " 2nd incomes.	17	13½	15	-2½
Rich. & W. P. T. 5s.	105½	103½	105½	-1½
Rich. & Danville 1sts.	116½	116	116	-1½
" " " " " 5s.	71	70½	71	-2
Union Pacific gold note 6s.	92	89	89	-3
" " " " " sink. fund 8s.	101½	100	100	-1
Ore. Nav. 1st 6s.	108	105½	105½	-2½
" " " " " con. 5s.	7½	67	67	-5½
Kan. Pac. 1st con. 6s.	89	84	84	-5
Ore. Short Line & U. N. con.	54½	48	48½	-5½
Ore. Short Line & U. N. col.				
lateral trusts.	45	41	41	-5
Oregon Short Line 6s.	87½	84	85	-3
Atch., Col. & Pac. 1sts.	45	40	40	-5
U. P. D. & Gulf 1sts.	45½	40	41	-6
Pl. Worth & Den. City 1sts.	76	73½	73½	-2½
W. N. Y. & Penn. 1sts.	101½	100½	100½	-1
" " " " " 2nds.	21	20	21	+ ½
Toledo A. A. & N. M. 1sts.	70	60	60	-10
Toledo A. A. & C. T. 1sts.	82	76	81	+6
Tol. A. A. & N. M. Mt. P. 1sts.	72	70	70	+3
Tol. St. Louis & Kan. City 1sts.	61	60	61	-¾
Average decline, \$2.63.				
Trunk Lines.				
Chic., Bur. & Q. 7s.	123½	122	122½	+ ½
" " " " " deb. 5s.	99½	98½	98½	-1½
" " " " " conv. 5s.	103½	102½	102½	-1½
" " " " " Neb. ex. 4s.	90½	90	90	-½
St. Paul 8s.	116	115	116	+1
" " " " " gold.	127	126	126	-1
" " " " " 1sts H. P. div. 7s.	128	127	127	+1
" " " " " Chic. & Pac. West 5s.	111½	110½	110½	-½
" " " " " 6s.	120½	119½	120	+ ¼
" " " " " general 4s.	93½	90½	91½	-1½
" " " " " cons. 7s.	129	128	128	-2
Rock Island 6s.	138	136½	138	+ ½
" " " " " Ext. 5s.	103½	103	103	-½
St. P. & Sioux City 1sts.	9½	92½	93	-½
Northwest gold.	126	125	126	+ ½
" " " " " 40 yr. deb.	127	125½	127	+ ½
" " " " " deb. 5s. 19½.	107½	107½	107½	+ ½
" " " " " S. F. 5s.	110	108	108½	-1½
Average decline, .15.	110½	107½	110	+ ¼
Trunk Lines.				
Penn. 4½s.	111	112½	113	+1½
P. C. C. & St. L. 4½s "B"	104	103	103½	+ ½
Lake Shore 1st 7s.	121½	119½	120	-1½
" " " " " 2nd 7s.	125½	123½	125½	+1½
Mich. Cen. 7s.	124½	119½	119½	-½
N. Y. Chic. & St. L. 4s.	100½	99	99½	-½
N. Y. Central 1st 7s.	127	125½	127	+ ½
" " " " " deb. 5s.	109½	108	109½	+ ½
Rome, Wat. & Ogd. Ext. 5s.	117	115	116	+ ½
West Shore 4s.	104½	104½	104½	-¾
Average advance, .00.				
Southwestern.				
Int. & Gt. Northern 1sts.	113	112	112½	+ ½
Kan. & Texas 4s.	8½	83½	82½	+ ½
" " " " " 2nds.	46	44	44	-2
" " " " " Mo. Kan. & East 1sts.	80½	79½	79½	-1
Missouri Pacific con.	94	91½	91½	-2½
Iron Mountain 2nds.	105½	104½	105½	+1
" " " " " 5s.	80½	75	75	-5½
Pac. of Mo. 1sts.	100½	99½	100½	+ ¼
St. Louis Southwestern 1sts.	58	55½	56	-2½
" " " " " 2nds.	17	14½	16	-2
Texas & Pacific 1sts.	84	83	84	+1
" " " " " 2nds.	21	22½	22½	-1½
Wabash 1sts.	104½	103½	104	-1
" " " " " 2nds.	77½	73½	74	-3½
" " " " " Det. & Chic. ext.	101	100½	100½	-½
North Missouri 1sts.	107½	106½	106½	-¾
Average decline, 1.32.				
Transcontinental.				
St. Paul M. & M. Cons. 6s.	121½	121	121½	+ ½
" " " " " 4½s.	101½	101½	101½	+ ½
" " " " " Mon. Cen. 5s.	102	101	102	+1
" " " " " Mon. ex. 4s.	88	86½	88	+1
" " " " " Dak. ex. 6s.	118	117½	118	+ ¼
Average advance, .25.				
Coastal.				
Jer. Central gen. 5s.	116	115	115½	+ ½
Lehigh & Wilk. con. ass'd.	111	110	110	+ ¾
N. Y. Ont. & West. 4s.	8½	84½	85½	+1
" " " " " con. 5s.	110½	109½	110½	+1½
N. Y. Sus. & West. ref. 5s.	106½	106½	106½	+ ¼
N. Y. Lack. & West.	133	133	133	+ ½
New Jersey Midland.	117½	117	117	-
Average advance, .62.				
Southern.				
Lou. & Nash. con 7s.	111	109½	111	+1½
" " " " " gold 4s.	76½	74½	74½	-1½
" " " " " N. O. & M. 1sts.	117½	116½	117	+1½
" " " " " 2nd.	104	102	102	-2
Kentucky Central 4s.	85	84	84	-½
Nash., Chat. & St. Louis con 5s.	102	100½	101½	+ ½
Average decline, .02.				
Miscellaneous.				
Am. Cotton Oil 6s.	113	111½	112½	+ ¼
Am. Dock & Imp. 5s.	111½	111½	111½	+1½
Bur., C. R. & N. C. T. 5s.	90½	89½	90½	+ ½
Ches. & Ohio con. 5s.	104½	104	104½	+ ½
" " " " " gen. 4½s.	75	73	73½	-1½
" " " " " R. & A. 1st con 4s.	92	91	91½	+ ¼
Consumers' Gas of Chic. 1st.	8½	80½	83½	+2½
Chm., Day. & Iron 1sts.	99½	97½	98½	+ ½
Chm. South 1sts.	109½	108½	108½	-1½
" " " " " 2nds.	105	104	104	-½
Chic. & East. Ill. con 6s.	122	121	122	+1
" " " " " con. 5s.	99½	97	98½	+ ½
Chic. Gas, Lt. & Coke Co.'s 5s.	87	8½	86	+2½
Denver & Rio Grande 4s.	77	72½	73½	-3
Ed. Elec., Ill. 1sts.	107½	105½	106½	-1

	High.	Low.	Last Sale.	Change from 1st Sale in April.
Eliz., Lex. & B. S. 1sts.	99½	99	99	-¾
General Electric deb. 5s.	89	86	88	+1
Hocking Val. 5s.	85	80½	81½	-1
Hous. & Texas Cen. gold 4s.	63½	62	62	-2½
Illinois Cent. 4s. 195.	99	98	98	-½
Iowa Central 4s.	94½	92	93½	-2
Kanawha & Mich. 4s.	75	73	73	-2
Laclede Gas 1sts.	87	85	86	-1
Lake Erie & West. 1st.	115½	114	114	-1
Long Island 4½s.	99	98	99	+2½
L. N. A. & Chic. con.	96	90	90	-6
Laclede Gas 1sts.	65½	64½	65	-2½
Mex. Int. 1st.	7½	71½	72	-1½
Morris & Essex con.	141½	140½	141½	+ ½
Manhattan Railway 4s.	90½	90½	97½	+ ½
Met. Elevated 1sts.	121	119½	121	+1½
" " " " " 2nds.	108	107	108	-
Mobile & Ohio gen. 4s.	65	60	61½	+ ¾
Mil., L. Shore & West 1sts.	126	125½	126	+ ¼
Ohio Southern 1sts.	95½	91	91	-4
" " " " " gen.	44	42	42	-2
Oregon Improvement 1st.	103	101½	102	-1
" " " " " 5s.	50½	54	54	-2
Peo. & Eastern 1sts.	74	72	72½	-4½
" " " " " incomes.	18	15½	15½	-4½
Pitts. & Western 4s.	88	86	87	-1
Rio G. Western 1st.	68½	65½	67	-1½
San An. & Ar. Pass 4s.	58	55	56	-½
Tol. Peo. & West 1sts.	83½	82	82	-1
Third Avenue 5s.	117½	115½	117½	+2
Ulster & Del 1st 5s.	104	99½	104	+3½
Union Elevated 1sts.	95½	91	92½	-½
Va. Midland gen. 5s.	88	86	86	-½
Average decline, .66.				

Consumption of Equipment on the Lake Shore.

From the last annual report of the Lake Shore & Michigan Southern Railway, we extract a table of general interest, of new equipment purchased and built 1869-1893.

YEAR.	Locomotives.	Passenger Train Cars.	Freight Cars.
1869	35	7	979
1870	25	2	522
1871	47	1	1,124
1872	74	20	1,638
1873	44	19	746
1874	35	5	351
1875			
1876			
1877			
1878			700
1879			1,300
1880			1,950
1881	60	6	2,870
1882		26	685
1883	7	14	30
1884		5	
1885			586
1886	3		300
1887	3	12	1,550
1888	7		29
1889	27	14	3,040
1890	25	16	1,400
1891	20	16	1,000
1892	6	60	2,100
1893	30	59	1,100
Total.	476	282	24,300
On hand Dec. 31, 1893.	591	428	20,781
Total Cost.			\$19,398,858
Charged to equipment account (prior to 1884).			9,816,187
Charged to operating expenses.			\$9,582,671

The several consolidations of railroads, by which this great company was formed, took place in 1869, and we do not possess an inventory of their united equipment until Dec. 31, 1870. The report for the year 1869 did not contain one; we suppose Mr. Leland had not then fairly "got hold." But we see by this table that reasonable additions to the equipment were made in both the years 1869 and 1870, and the sums charged to repairs in 1870 were liberal, being for

Locomotives	\$543,973.74
Cars	659,987.46

And there were owned, on Dec. 31, 1870,

Locomotives	299
Passenger cars	247
Freight cars	6,077

Length of road operated at that date.	1,015.06
Length of road operated Dec. 31, 1893.	1,499.90
Average length operated during 23 years.	1,308.40

These figures are given for the use of any who may wish to make further averages than the following:

Average consumption, during 23 years, of

	Locomotives.	Pass'g'r Cars	Freight Cars
On hand Dec. 31, 1870.	299	247	6,077
Purchased and built.	416	273	22,799
	715	5.0	28,876
Deduct now on hand.	591	428	20,781
Have disappeared.	124	92	8,095
Per annum.	5½	4	352
Per centum per annum.	1½	1½	2½

The Lake Shore probably repairs its equipment longer than most other roads, for the reason that it has not had the same motive for replacing its older and lighter engines and cars which most other large roads have. Circumstances and good judgment have led the management to make the largest outlay in the improvement of grades and alignment; but these figures show about how small renewals may be, if repairing is carried as far as is anywhere judicious.

On May 24, a glass in the lubricator of a locomotive hauling a fast passenger train, on the Chicago, Burlington & Quincy, burst, and the incident gave the daily press a

sensational story. Some of the papers had it that a tank of oil had exploded, and as it was known that the "Q" was experimenting with burning oil in the locomotive fire-box it was concluded that the tender of oil had exploded. Another paper said that the lubricator on the boiler head burst, and that the engineer and fireman were badly burned with the burning coal oil. The facts are, that the engineer and fireman were so badly injured by the hot oil from the broken glass, that they could not proceed with the train and another crew took their place. The accident emphasizes the necessity for an automatic device in the lubricator, which will prevent the escape of oil or steam from the lubricator, in case the sight glass is broken. The Detroit Lubricator Co. was awarded a diploma at the Columbian Exposition for such a provision in its new lubricator. The oil-burning experiment on the Chicago, Burlington & Quincy has been discontinued, but this slight accident had nothing to do with it one way or the other.

More than two years ago, namely, Jan. 8, 1892, we published a careful account of the work which has been going on now for five years in the practical reconstruction of the Chesapeake & Ohio Railroad. That work includes double tracking, constructing and extending side tracks and yards, laying down 75-lb. rails with stone ballast, installing signal and interlocking towers and block signals, filling in of trestles, replacing wooden bridges by steel, providing more and heavier rolling stock of all classes, and in fact making a thoroughly first-class road, and to-day the Chesapeake & Ohio, with its admirable tracks, its low grades, its fine passenger and freight equipment and its good operating system, takes high rank among the railroads of the country. All trains, freight and passenger, are run from Newport News to Cincinnati under the block system, and in fact the freight trains are absolutely blocked, that is, so far as absolute blocking is done anywhere. The improvements are still going on and the plans now in hand contemplate the further extension of the double track. There are, however, certain sections of the road on which the cost of double tracking would be so great as to be almost prohibitory, and on two such short sections another plan will soon be tried; that is, on two miles near and including the Jerry's Run bank, and on 11 miles immediately west of Hinton. Here the single track will be retained on account of the natural obstacles to double tracking, but the track will be laid with 100-lb. rails. These rails have been rolled at the Edgar Thomson works. The section is that recommended by a committee of the American Society of Civil Engineers in the standards recently published. The rails were made to the mills' specifications and were inspected by the R. W. Hunt Co. They are 30 ft. long, drilled as follows: End of rail to center of first hole, 1½ in.; center of first hole to center of second hole, 5 in.; center of second hole

NEW PUBLICATIONS.

Directory of the Iron & Steel Works of the United States.—Twelfth edition, corrected to February, 1894. Philadelphia: The American Iron & Steel Association, 261 South Fourth street.

It is unnecessary to say that this is a well-known and an indispensable book of reference, being a very complete directory of the Iron and Steel industry of the United States. Mr. Swank says that for the first time there is given a list of works in our country which produce tinned or retinned stamped ware; a list of the works which make horseshoe nails; a list of all iron and steel bridge building works, and a list of iron and steel shipbuilding works. We quote certain interesting figures.

The unfavorable conditions existing in 1893 have continued in full force during the early months of 1894. In the edition for 1892 there were enumerated 569 completed blast furnaces, and 11 of which were in course of erection. The total annual capacity of the completed furnaces was 14,550,708 gross tons. In the present edition are described 519 completed furnaces, with an aggregate annual capacity of 16,271,027 gross tons, or just 50 furnaces less than in 1892, and 7 furnaces which have been partly erected but upon which work has been suspended. Not one furnace in the United States is now being built. Since February, 1892, there have been built 16 new furnaces, and in the present edition we have transferred to the abandoned list 66 furnaces which were classed in 1892 among the furnaces that were then active or likely to be active at some future time. Of these 20 are in Pennsylvania, 11 in New York, 7 in Ohio, 6 in Virginia, 4 in Tennessee, 3 each in Michigan and Missouri, 2 each in Connecticut, Maryland and Alabama, and 1 each in Maine, New Jersey, Kentucky, Georgia, Illinois and Wisconsin. Of the 16 new furnaces built since January, 1892, 7 are in Tennessee, 5 in Virginia, and 1 each in New York, North Carolina, Alabama and Wisconsin. The number of charcoal furnaces has decreased in two years proportionately much more than the number of furnaces using mineral fuel.

The average annual capacity of the 569 completed furnaces which were described in the Directory for 1892, was 25,572 gross tons, and the average annual capacity of the 519 furnaces which are described in the present edition is 31,351 gross tons. The aggregate annual capacity of the 519 completed furnaces which are now described is 1,720,319 tons more than the capacity of the 569 completed furnaces which were described in January, 1892.

The present edition of the Directory gives 487 complete rolling mills and steel works in the United States, of which 446 contain trains of rolls. The edition of two years ago gave 460 completed rolling mills and steel works. In the intervening time 57 new rolling mills and steel works have been built, 1 has been revived, and 31 have been abandoned. In January, 1894, there were 8 rolling mills and steel plants in course of erection and 1 rebuilding, against a total of 18 works which were in course of erection at the beginning of 1892.

The number of puddling furnaces attached to rolling mills in January, 1894, each double furnace being regarded as the equivalent of two single furnaces, was 4,715, against 5,120 in January, 1892, a decrease of 405 furnaces, or about 8 per cent.

In the two years there have been built 4 new standard Bessemer steel plants—one at Garwood, N. J., recently abandoned; one at Shenango, Pa., to make steel billets; one at McKeesport, Pa., to make steel slabs and billets; and one at Indianapolis, Indiana, to make steel bars and miscellaneous shapes. In the same time 7 standard Bessemer steel plants have been burned or abandoned—2 in Massachusetts, 1 in New Jersey, 1 in Tennessee, 2 in Illinois, and 1 in Missouri, and in the same period 1 Clapp-Griffiths steel plant has been abandoned. There are now 43 standard Bessemer plants, with 95 converters, against 46 in 1892, with 95 converters. One new standard Bessemer plant is being erected at Youngstown, Ohio, to contain two 10-gross-ton converters, for the production of rails, structural shapes, etc. No new Clapp-Griffiths or Robert-Bessemer plants have been built since 1889.

The annual converting capacity of all the standard Bessemer steel plants in 1894, built and building, is 7,740,900 gross tons of ingots and direct castings, against 5,857,143 tons in January, 1892.

Since the appearance of the Directory for 1892 we have built 15 new open-hearth steel plants, while 5 have been burned or abandoned, showing a net increase of 10 plants. We have now 81 completed open-hearth steel plants, and in addition 1 new plant is in course of erection at Chicago by the Illinois Steel Co. The annual capacity in ingots and direct castings of the open-hearth steel plants in 1894, built and building, is 1,740,000 gross tons, against 1,383,929 tons in January, 1892.

The manufacture of basic steel in this country is virtually confined to four works in Pennsylvania, three using the open-hearth and one using the Bessemer process. Outside of Pennsylvania basic steel has been made only experimentally or on a very small scale. The industry has made no progress in the South.

TRADE CATALOGUES.

Concrete Construction.—Messrs. Ransome & Smith Co., 269 Dearborn street, Chicago, have just issued a small pamphlet entitled "Concrete or Monolithic Construction," which includes a description of the patents of Mr. Ernest L. Ransome, and something on the use of concrete in building operations. A brief history of concrete or monolithic construction is given, followed by an account of

Ransome's concrete and twisted iron construction. The application of this twisted iron work in connection with concrete, to foundations, floors, ceilings and wall work, is described and illustrated. Formulae are given for the strength and the proportion of parts to be used. The combination of the iron and concrete is not greatly unlike that of the Monier system and Millan system, heretofore described in our columns, but by the Ransome process the rods, strands and pieces are twisted to give the concrete greater adhesion to the iron. Some pages are given to the subject of monolithic subways for sewers, electric conduits, drains, etc. The Ransome vault lights or concrete illuminating tiling is described, as well as the company's concrete mixing machines. The pamphlet concludes with illustrations and descriptions of works in which the combination of iron and concrete have been used in this country, including the Leland Stanford University Museum, some residences and manufacturing plants and arch bridges.

Railroad Matters in Chicago.

Freight Traffic.—The deliveries at Chicago the past week aggregated 3,684,000 bushels by eleven leading lines, showing an increase of 1,232,000 bushels over the week immediately preceding. The excess was less than was generally anticipated; the advantage was also partly offset by a decrease in some other leading classes of traffic, including flour and live stock, the movement of which was disappointing, as an increased business was predicted. General Manager Earling, of the Chicago, Milwaukee & St. Paul, who has been making a canvas of the situation along the line of his system in Wisconsin, Minnesota and the Dakotas, is represented as saying that the promise for business in those States during the summer is far less assuring than at the same time last year. And decreased earnings by the roads traversing those States are deemed certain. Advances from along the Illinois lines and west of the Mississippi are more assuring. It is claimed that there are still large quantities of grain and other property to come out, and that its movement is only a question of time. The scarcity of coal tonnage, caused by the miners' strike, is a serious loss to the roads. The shipments of merchandise and other freight to the country, make a better show than in-bound business, compared with the same time last year. Those connected with the iron and other large industries, state that they hold large orders for materials to be shipped as soon as fuel can be obtained for the resumption of work. Prospects for continued good shipments of merchandise the coming month are also represented as improving, and promise to equal the summer business in 1893. But the fair average on such traffic will scarcely compensate for the loss on the other classes of business, already referred to, and decreased earnings seem assured.

The following shows the deliveries of grain (bushels) at Chicago, by the leading Western railroads for the week ending May 26, and the corresponding time the two preceding years:

	1894. Grain.	1893. Grain.	1892. Grain.
N. West	819,000	728,000	175,000
Ill. Cent.	461,000	698,000	232,000
C. R. I. & P.	371,000	14,000	332,000
C. B. & Q.	714,000	1,590,000	450,000
C. & Alton	138,000	125,000	104,000
C. & E. Ill.	27,000	125,000	61,000
C. M. & St. P.	639,000	391,000	332,000
Wabash	187,000	120,000	111,000
C. & Gt. W.	97,000	127,000	127,000
A. T. & S. Fe.	224,000	185,000	360,000
L. N. A. & C.	7,000	1,000	...
Total bush.	3,684,000	4,104,000	2,284,000

The deliveries of flour (barrels), by the leading Western railroads for the week ending May 26, and the corresponding time the two preceding years compare as follows:

	1894. Flour.	1893. Flour.	1892. Flour.
N. West	6,422	15,495	17,457
Ill. Cent.	450	510	280
C. R. I. & P.	12,383	8,100	3,250
C. B. & Q.	14,602	15,179	11,015
C. & Alton	9,300	800	900
C. & E. Ill.	150	300	...
C. M. & St. P.	11,300	18,750	13,050
Wabash	2,335	750	2,165
C. & Gt. W.	7,138	15,127	20,935
A. T. & S. Fe.
L. N. A. & C.
Total bbls.	64,580	75,011	69,052

Passenger Traffic.—There is no improvement in the volume of passenger business over any of the Western roads. This applies as well to the interior lines as to those centering here. Without exception, the managers of the latter report through business between this and other points small, and interior local travel, while better than the former, is less than the average at the close of spring in recent years. Nor do the officials see any hope of a revival. In no department of traffic is the small business more noticeable than on the sleepers. Referring to the threat of the officials of the American Railway Union to boycott the Pullman Palace Cars on all the roads where they are in use, a party, who has been investigating the situation, said: "Should the trainmen refuse to handle Pullman cars it would be a good thing for both the Pullman Company and the railroads, as travel the past two months has not paid the expense of hauling and charge of maintenance."

The officials of the city railroads complain of a severe decrease in receipts, and the Lake Street Elevated, which

serves a large and populous district, has given notice of a reduction of 10 per cent. in wages, the officials claiming that the earnings are not equal to operating expenses. It is also said that like conditions exist with the South Side Elevated and electric roads.

Flood Damages.—Investigations since the subsidence of the storms in the Northwest are reported to show that the damage to road beds, culverts and bridges, from floods and washouts was small compared with the first estimates, the bridges and culverts destroyed being mainly inexpensive. The delays to business were more serious on most of the divisions than the cost of repairing.

Judge Goggin, in the Circuit Court here, has rendered an important decision for the railroads and grain receivers. The case is an old one, and runs back into 1891, when a grain shipper at Janesville, Wis., secured bills of lading for five car loads of oats that were never shipped. The shipper secured advances on the strength of the bills of lading from a commission firm. The latter, in their dealings with the shipper, were unable to get their money back, and brought suit against the Chicago, Milwaukee & St. Paul, to recover the value of the oats for which it had issued bills of lading. The St. Paul company, in its defense, claimed to have substituted other cars for the original ones. The court, however, decided in favor of the commission men, giving them the full value of their claim with interest from December, 1891.

CHICAGO, May 28, 1894.

Damage by the Floods.

Later reports show that the damage by the floods of May 18-21 was fully as widespread as reported in the *Railroad Gazette* of May 25, and the total damage at Williamsport, Pa., is stated at \$3,000,000. The damage to railroads has been considerably exaggerated, however, in many cases. While the stoppage of traffic on many roads was complete for a short time, the actual injury to the roadway in many cases consisted only of ordinary washouts. The Western New York & Pennsylvania and the Buffalo, Rochester & Pittsburgh got into fair shape on Thursday the 24th. The through trains of the Erie between Hornellsville and Jamestown had to run by way of Buffalo until Wednesday. The Dansville & Mount Morris road was completely tied up for a week.

The storm was severe on the smaller railroads throughout central Pennsylvania. Our correspondent at Harrisburg sends notes of damage on ten different roads, as follows: The Cambria & Clearfield was badly damaged for 2½ miles. The roadway of the Ebensburg & Black Lick suffered to the extent of \$10,000. There was a washout on the Newport & Sherman's Valley, between Cisna Run and Andersonburg. Bridges on the Tuscarora Valley at East Waterford and Bealetown were displaced and the track undermined. Sections of the Buffalo & Susquehanna in Clinton County, Pa., were washed out. The Central of Pennsylvania had a number of washouts between Hubersburg and Salona. There was a washout on the Beech Creek at Monument. The railroad owned by Gleason & Sons and Howard & Perley, and operated by F. A. Blackwell on Youngwoman's creek, was damaged to the extent of \$25,000, some 10 miles of track and all the bridges and culverts being washed out. At Riverside Park, a few miles below Bradford, the Buffalo, Rochester & Pittsburgh track was badly washed out. All the bridges and trestles on the Six-Mile-Run road were badly damaged. There was a severe washout on the Jersey Central between Penn Haven Junction and Mauch Chunk. Many railroad bridges were saved by being loaded with heavy car-loads of stone and iron.

We give below such notes as we have received from officers of the railroads referred to. The Baltimore & Ohio suffered no serious damage by this storm, except to a few small trestles on branch lines, and at Philadelphia, as reported last week. The Pittsburgh & Western had no trouble except that the terminal station at Allegheny City was flooded for 36 hours. The Fall Brook Railway, which had a number of land slides, was opened for business on Tuesday, May 22. The obstructions were mostly between Ansonia and Blackwell's, a distance of 16 miles. One land slide was so large that the temporary track built around it was 75 ft. from the line.

The New York, Lake Erie & Western suffered only slight damage to bridges, but it had a serious washout near Addison, N. Y., one 1,200 ft. long near Belmont, and a shorter one at Wellsville. Tracks were submerged at several places on the Bradford Division, and a length of 500 ft. was washed out on the Buffalo & Southwestern Division near Waterloo. On the Tioga Division there were a number of washouts, two of them being each over 200 ft. long.

The double track bridge of the Philadelphia & Reading at Muncy, which was carried off, was 810 ft. long, in five spans, and two of the piers were carried away. Another bridge of three spans, 150 ft. each, was lost at West Milton. This road suffered from a brief but severe storm near Philadelphia on May 28, and a building undermined by the floods is reported to have fallen upon the track only a few seconds after a passenger train had passed.

The Pittsburgh Division of the Pennsylvania was restored on Wednesday night, May 23. The damage on this road is summarized by the Engineer of Maintenance of Way, Mr. Richards, as follows:

"The damage done by the recent flood to our railroad is not nearly as great as reported. Our anxiety was great, of course, during the heavy rains, and at times it looked as if we might lose our Susquehanna River bridges at several points, but fortunately not even a span was dislodged.

The country road bridges suffered greatly, and at Williamsport two county or city bridges across the Susquehanna River were completely washed away, floating against our bridges with great force; but they only knocked the outside weather boarding and some of the laterals out of place, and our bridges were fit for use immediately after the receding of the water.

The water at Williamsport reached the height of 31 ft. above ordinary water level, which was within 2 ft. 6 in. of the flood of June, 1889. Eighteen miles east of Williamsport, at Montgomery bridge, the water was within 10 inches of the height of the June flood of 1889.

The great quantity of logs and sawed lumber from the broken boom at Williamsport severely battered the lower chords of our iron bridges as far down the river as Selinsgrove Junction. The iron spans of some of the dislodged bridges were carried down stream by the buoyancy of the logs and lumber for quite a distance, and in one case for six or eight miles. A wooden bridge belonging to a private corporation at Lewisburg floated down stream to Northumberland, where it cut through the middle of a county bridge, a wooden covered structure, striking about the middle of the span, tearing out the bottom chord braces, and cutting the bridge completely in two a short distance below the top chord, leaving the top chord, the bracing at the ends, and the spur ends of the arch intact, together with the roof. This is a remarkable case. The framing was tied together so that the roof does not show even a depression in its alignment.

On the main line between Philadelphia and Pittsburgh our track was covered with water for miles in the neighborhood of Steelton and Harrisburg, and in a few cases the ties, spiked to the rails, floated the track about, but these were soon put in place after the floods subsided. The damage, however, was but slight. Pieces like this, 500 ft. to 1,000 ft. long were dislodged at numerous places, and to our surprise we found that the ballast remained in good position to receive the track again. There were quite a number of small land slides even along our well sodded banks, noticeably in the vicinity of Bryn Mawr, on the Philadelphia Division, where a handsome sod, probably a mile long, broke and slid down into the ditch. While this is not a great loss, it presents a sorry appearance in a well trimmed and nicely finished road.

On the Middle Division, between Harrisburg and Altoona, the Juniata River rose nearly as high as in 1889. Our stone bridges stood in most excellent condition, although submerged to the springing line, and in no case have they given away.

On the Pittsburgh Division, between Altoona and Pittsburgh, the Conemaugh, ordinarily a small stream, was swollen to such an extent that it washed out the road-bed at a change of the creek channel, near bridge No. 6, a few miles east of Conemaugh Station, for a length of about 800 ft. This was soon trestled over, legs 6 to 12 ft. long being required. In this washout the creek regained its original channel. This result often occurs where creek channels are changed and run along a newly constructed bank, instead of making two bridges and allowing the stream to continue in its natural bed. Engineers are very likely to adopt this form of construction, and the operating department suffers in consequence.

The maximum rainfall at Altoona from noon of Saturday, May 19, to noon of Monday, May 21, was 4.92 in.

In the great June flood of 1889, the total rainfall from noon of May 30 to noon of June 1, was 5.33 in., or a little greater than the largest 48 hours of the present rainfall.

The Coal Strike.

The coal strike remains unsettled, and as we go to press there are few hopeful indications in sight. The operators of Central Pennsylvania have met and decided to resume work with new men, but their plans are not yet definite. The most prominent news since our last issue consists of reports of violence by the strikers. It is estimated that 175,000 miners are idle in 14 States and two Territories. The freight earnings of the railroads are, of course, greatly diminished and the reduction is very serious on the railroads of Pennsylvania.

In the vicinity of Terre Haute, Ind., the miners have stopped freight trains in dozens of cases. On Friday last about 700 miners seized a train and started for Pana, Ill., over the Big Four, but it appears that the officers of the road succeeded in thwarting them before they had gone far. From Brazil, Ind., it was reported that strikers were carried to mass meetings free by the railroads to avoid trouble. At Minonk and other places in Illinois, the militia was called out to quell incipient riots. At Cripple Creek, Col., there were numerous encounters between the officers of the law and the miners last week, and one miner was killed and several wounded.

The mines in West Virginia and elsewhere, which have not been closed, are still doing an enormous business. From points along the Baltimore & Ohio, large quantities of coal are being shipped to New York all rail. The anthracite dealers have experienced a large increase of business. The Philadelphia Public Ledger, in its weekly review on Monday last, said:

"The anthracite coal trade has been more active during the past week, due to speculative buying in anticipation of an advance in the circular prices for coal on June 1. The prevailing low rates of vessel freights, incident to the scarcity of soft coal, has also induced Eastern dealers to take advantage of their opportunity to save both in prices for coal and transportation rates as well, and hence the increased shipments of hard coal during the past week.

The Reading Coal and Iron Co.'s collieries in the Shenandoah district have all been put on full working time."

The movement of culm and other fine anthracite to New England is said to have largely increased. The New York Central borrowed some anthracite burning locomotives from the Delaware, Lackawanna & Western. The Pennsylvania Lines west of Pittsburgh are using wood wherever possible. The Chicago & Grand Trunk is reported to be using some hard coal, but the report that this road refused grain at Chicago on account of the scarcity of fuel for the locomotives, comes from Port Huron with a different coloring; it is stated that this class of freight has been carried at a loss, and that, therefore, the road was glad of a chance to refuse it.

The Mineral Production of the United States in 1892 and 1893.*

The immensity and variety of the mineral production of the United States may be appreciated after an inspection of the accompanying table giving the output of the chief mineral products and the value of the same in 1892 and 1893. These statistics have been compiled for Vol. II. of

gained \$4,000,000 in value, thus partly offsetting the decline in bituminous, and gold increased \$3,000,000. The figures clearly show the solid foundation upon which the country's prosperity is based, and its stability.

The growth of the mineral industry of the United States has been so rapid as to be wholly beyond comparison with any other nation. Fifty years ago this country began to take rank as one of the important producers. In 20 years it had won a position among the leading nations, and now it not only excels all others, but the value of its products is almost as great as the value of the combined output of Great Britain, France and Germany. In 1864 the United States, with an output of 22,860,000 metric tons, stood third among the coal producing nations, Great Britain leading with over 90,000,000 tons, Germany 26,000,000. In the 30 years since that time Great Britain has a little more than doubled its output. Germany has trebled, but the United States has increased eight times and produces now almost as much as Germany and all the rest of the world taken together, excepting only Great Britain. In the production of pig iron our growth has been even more remarkable. In 1865 the pig producing countries ranked with Great Britain first, then France, Germany and the

THE MINERAL PRODUCTION OF THE UNITED STATES, 1892 AND 1893.

Compiled for THE MINERAL INDUSTRY, VOL. 2, by Richard P. Rothwell, editor "The Engineering and Mining Journal."

No.	Product.	Customary Measures.	1892.		1893.	
			Quantity.	Value at Place of Production.	Quantity.	Value at Place of Production.
			Customary Measures	Metric Tons.	Customary Measures	Metric Tons.
1	Asbestos.....	Short tons.....	100	91	120	109
2	Antimony Ore.....	" ".....	850	771	850	771
3	Asphaltum and asphalt rock.....	" ".....	47,040	42,675	34,944	31,701
4	Barytes (crude).....	" ".....	28,476	25,893	142,380	133,160
5	Bauxite.....	" ".....	9,800	8,891	49,000	44,161
6	Borax.....	Pounds.....	12,538,196	5,687	940,365	8,699,000
7	Bromine.....	" ".....	379,480	172	64,512	348,399
8	Building Stone.....	" ".....	44,589,500	44,589,500	44,589,500	44,589,500
9	Cement, hydraulic.....	Barrels of 300.....	8,211,181	5,999,150	7,503,385	5,180,797
10	Cement, Portland.....	400 lbs.....	547,440	1,153,600	596,531	1,152,839
11	Coal, anthracite.....	Long tons.....	46,850,405	47,352,696	89,727,982	48,044,834
12	Coal, bituminous (c).....	" ".....	114,220,101	116,059,045	134,230,532	115,263,204
13	Coke.....	Short tons.....	12,010,829	12,204,293	33,421,117	9,792,350
14	Cobalt oxide.....	Pounds.....	8,000	8,891	6,420	9,949,986
15	Copperas.....	Short tons.....	13,250	12,021	110,272	16,000
16	Copper sulphate.....	Pounds.....	54,000,000	54,000,000	54,000,000	54,000,000
17	Corundum.....	Short tons.....	1,504	1,364	139,994	1,747
18	Chrome ore.....	Long tons.....	1,650	1,677	16,500	1,620
19	Feldspar.....	" ".....	16,000	16,258	80,000	17,000
20	Flint.....	" ".....	37,000	37,596	185,000	38,612
21	Fluorspar.....	Short tons.....	9,000	8,165	54,000	9,700
22	Grindstones.....	" ".....	294,320	292,458	304,800	45,580
23	Gypsum.....	" ".....	294,320	292,458	695,492	234,000
24	Infusorial earth and tripoli.....	" ".....	1,323	1,300	41,950	1,709
25	Lime.....	Barrels, 200 lbs.....	70,000,000	6,350,300	38,500,000	60,000,000
26	Limestone for iron flux.....	" ".....	4,560,000	4,633,416	2,097,600	3,750,000
27	Magnesite.....	Short tons.....	1,402	1,272	9,814	1,143
28	Manganese ore.....	Long tons.....	19,117	19,425	129,586	9,150
29	Marls.....	Short tons.....	125,000	113,400	65,000	110,000
30	Mica.....	Pounds.....	75,000	34	100,000	75,000
31	Millstones.....	" ".....	20,000	20,000	20,000	20,000
32	Mineral Paints.....	Long tons.....	50,000	50,805	650,000	50,000
33	Natural gas.....	" ".....	14,800,000	14,800,000	14,800,000	14,800,000
34	Onyx.....	Cubic feet.....	3,500	4,000	2,175	2,175
35	Ozokerite (refined).....	Pounds.....	130,000	59	7,800	None
36	Petroleum.....	Bbls., 42 gals.....	50,512,136	7,000,982	30,229,128	50,249,228
37	Phosphate rock.....	Long tons.....	902,723	917,257	3,322,021	981,340
38	Plumbago (crude).....	Short tons.....	900	816	3,500	1,365
39	Plumbago (refined).....	Pounds.....	1,398,363	634	67,902	896,003
40	Potters' clay.....	Long tons.....	450,000	457,349	1,000,000	395,000
41	Precious stones.....	" ".....	188,000	188,000	188,000	188,000
42	Pyrites.....	Long tons.....	106,250	109,957	357,000	95,000
43	Salt.....	Barrels, 280 lbs.....	11,784,954	1,542,133	5,900,000	11,435,487
44	Slate (for pigment).....	Short tons.....	3,400	3,085	21,000	3,000
45	Slate (for roofing).....	In squares.....	953,000	3,396,625	871,500	2,780,600
46	Slate (other kinds).....	" ".....	750,500	750,500	750,500	750,500
47	Soapstone.....	Short tons.....	23,308	21,054	423,449	20,100
48	Soda, natural.....	" ".....	3,300	2,994	16,500	2,500
49	Soda, natural sulphate.....	" ".....	1,680	1,524	8,400	90
50	Sulphur.....	" ".....	1,825	1,656	54,750	1,344
51	Talc (fibrous).....	" ".....	41,925	38,034	472,485	36,500
52	Venetian red.....	" ".....	4,205	3,815	89,335	3,830
53	Whetstones (g).....	Gross pounds.....	1,000,000	1,075,800	900,000	900,000
54	Zinc, white.....	Short tons.....	27,500	24,946	2,200,000	25,000
Total non-metallic.....				396,610,582		371,376,935
METALLIC.....						
55	Aluminum, value at N. Y. b.....	Pounds.....	295,000	134	191,750	312,000
56	Antimony, value at S. Fran.....	Short tons.....	200	181	36,000	350
57	Copper, value at N. Y.....	Pounds.....	325,500,000	147,647	36,716,400	322,585,500
58	Gold, coining value.....	Troy ounces.....	1,596,375	49,652	32,997,071	1,739,081
59	Pig iron, value at N. Y.....	Long tons.....	8,977,869	9,122,413	134,668,035	7,043,384
60	Lead, value at N. Y.....	Short tons.....	205,630	186,548	16,450,400	193,928
61	Nickel (fine).....	Pounds.....	96,152	43,614	57,691	25,893
62	Platinum (crude).....	Troy ounces.....	350	111	1,750	300
63	Quicksilver, value at S. F.....	Flasks, 76 1/2 lbs.....	27,993	971	1,119,720	30,164
64	Silver, coining value.....	Troy ounces.....	65,000,000	2,022,195	84,038,500	60,500,000
65	Spiegel-eisen and ferroman.....	Long tons.....	179,131	182,015	6,647,290	81,118
66	Tin.....	Pounds.....	143,400	65	20,827	None
67	Zinc, value at New York.....	Short tons.....	84,082	76,279	7,785,993	76,255
Total metallic.....				320,740,427		267,707,795
Est. prod'ts. unspecified.....				7,500,000		7,500,000
Grand total.....				724,821,009		645,084,730

(f) Estimated. (g) Includes scythestones and novaculite. (h) Value taken as average of spiegel-eisen and ferromanganese, assuming production to have been one-third ferromanganese. (i) Including nickel in copper-nickel alloy and in exported ore and matte. (j) The production of petroleum stated in gallons is calculated in kiloliters, and converted to metric tons, by multiplying by 0.88. This gives an approximate result, the specific gravity of the various kinds of oils varies.

"The Mineral Industry: Its Statistics, Technology and Trade." While no statistics are absolutely and mathematically exact, yet these are beyond doubt not only the fullest but the most accurate that have ever been compiled for the mineral production of the United States.

It will be seen that in the year 1893 the mineral and metal production of this country as compared with 1892 has not declined in quantity as much as might have been expected from the financial depression, but it does show a material decline in values, amounting to over \$79,000,000. It is a noteworthy fact that the mineral production alone, while almost one-third greater in value than the metal product, decreased only one-half as much. Of the total decrease, over \$30,000,000 was in the decreased production and shrinkage of values in pig iron; \$9,000,000 was in coke and \$6,000,000 in bituminous coal, both of which were largely due to the decline in pig iron production. In silver the decrease in value amounted to \$6,000,000. In but few cases was there any increase. Anthracite coal

United States; Great Britain alone producing almost six times as much as the United States. But in 1892 the United States output was more than 11 times as much as 30 years before, and almost half again as much as Great Britain; as much as Germany, France, Belgium, and Austria-Hungary all together; or, as Great Britain, France and Austria-Hungary; in the second half of 1893 our iron production suddenly dropped enormously. These two staples, iron and coal, serve to show the quick rise to supremacy as a producing country.

TECHNICAL.

Manufacturing and Business.

Petitions for the final discharge of the receivers of the Cofrode & Saylor plant, Pottstown, and the Reading Rolling Mill Co., owned and controlled by nearly the same capitalists, will shortly be presented to the courts, and these two industries turned over to the stockholders.

* By Mr. R. P. Rothwell, editor Engineering and Mining Journal.

The National Switch & Signal Co. has ordered the new machinery for its shops at Odenweldertown, Pa. The officers of the company expect to have the plant in operation by the middle of July.

The Sterlingworth Railway Supply Co., was incorporated in New York, May 17. F. W. Coolbaugh is President; L. R. Pomeroy, Vice-President, and F. S. Bruen, Secretary and Treasurer. The company will deal in railroad equipment specialties. The office of the company is at 256 Broadway, New York.

Queen & Co., incorporated, the well-known Philadelphia manufacturers of surveying and scientific instruments, announce that they have opened a New York office at 116 Fulton street. The entire business of Mr. G. S. Woolman, who has so long dealt in scientific instruments at that place, has been purchased by Queen & Co. The branch office established at that point will be in charge of Mr. Woolman, as agent for the Philadelphia company.

The Hamilton Bridge Co., has decided to close its works at Hamilton, Ont., and has given a month's notice to that effect to its employees. Mr. William Hendrie, President of the company, in a newspaper interview, states that it is not likely that the plant will be started up again. The company has found itself unable to compete with the other bridge companies in Canada.

Iron and Steel.

A charter was issued May 22, at Harrisburg, to the Kittanning Iron & Steel Co., of Kittanning, capital \$350,000. Directors, James Mosgrove, John A. Colwell, of Kittanning, and Charles T. Neale, of Pittsburgh.

The Edgar Thomson Steel Works have closed down in all departments but one. The cause is lack of iron and coke.

New Stations and Shops.

Van Brunt & Howe, of Kansas City, have been selected as the architects for rebuilding the new Union station at Denver, which was partly burned a few months ago. The plans of the architects provide for using the walls of the old structure, but the appearance of the main part of the structure will be considerably altered. The new tower will be 160 ft. high, 40 ft. higher than the old tower, and it will have an illuminated clock.

Another Ocean Record.

The Cunard Steamship *Lucania* made a new record for speed and distance on the westward passage ending May 25. She followed an extreme southerly course and steamed 2,873 knots in 5 days, 12 hours, 57 minutes. The best previous record made by her last November was 2,780 knots in 5 days, 12 hours, 47 minutes. The *Lucania's* daily runs on the run ending May 25, were 536, 537, 539, 519, 530 and 212 knots, an average of 20.8 knots an hour of 60 minutes, or 21.625 knots per steamship hour, westbound. The best average daily run of the *Lucania* last season was 21.01, and of the *Campania* 21.284 knots per steamship hour. The best daily run of the *Lucania* last week of 539 knots, is 21 knots below her record of 560 knots last season. For the round trip, over and back, the *Lucania* has beaten all records. After July 1, the sailing distances are shorter by nearly 100 knots, and some quick passages may be looked for.

Liverpool Overhead Railway.

The extension of the Liverpool Overhead Railway to the Seaforth Sands station, having been approved by the Board of Trade, was opened for public traffic April 30. The extension is from the northern terminus at the Alexandra Docks station to the outlying northern districts along the Mersey estuary. The structure was sometime ago completed for a half-mile beyond the Alexandra Docks to the point where the repair sheds are now situated, and the new portion extends from this point for about 500 yards to the Seaforth Sands station. The extension has cost about £30,000. The contractors were Messrs. Holme & King, of Liverpool, with Messrs. Pearson & Knowles, of Warrington, and the Phoenix Foundry Co., of Derby, as sub-contractors. The engineers are Sir Douglas Fox and Mr. J. H. Greathead; Mr. S. B. Cotterell, General Manager of the Company, having acted as resident engineer. The total length from the Hercules Docks station, at the south end, to the Seaforth Sands station, at the north end, is now a little over six miles, and the total expenditure in construction and equipment has amounted to over £600,000. At present there are 14 stations on the six miles, and it is proposed to open three new stations.

A Terebo-Proof Pile.

A terebo-proof pile has been patented by R. B. Markle, of San Francisco. He designed his pile with knowledge of the facts that the terebo does not cross a crack of any kind and has made a built-up pile. The core is a 4 in. by 4 in. scantling, to which are nailed strips of 1-in. boards which increase in width with each layer until the pile reaches the desired size. The scantling and the boards are coated with a light coat of coal tar and are tacked together with nails. The corners are beveled. It is said a single band cap at the top prevented splintering. One of these piles was put down at Section 2 of a sea wall where the average life of a pile is only two years, and when it was taken up at the end of seven years, only the outer strips of the built-up pile were destroyed. The worms had stopped when they came to the cracks. It is estimated that the built-up pile will last about 25 years (which seems too long, as the worms will destroy the value of each strip as soon as they get into it). The cost is said to be about twice that of an ordinary pile.

An Automatic Water Tank.

The automatic water tank is the name given to a new system of water supply for locomotives recently invented. It consists of a large tank placed in a well near the surface of the water, the tank being normally full of water. The water is expelled by forcing steam into the top of the tank, the steam under pressure displacing the water and forcing it up through piping to the tender, the automatic tank refilling itself by the atmospheric pressure after the steam has been shut off. A visit to the tank station shows the perfect feasibility of this plan. The locomotive tender was supplied with water in three minutes' time and the tank refilled in about one minute. A full and complete description of this apparatus will be given in a later issue.

THE SCRAP HEAP.

Notes.

The Minnesota anti-scalper law has been held to be constitutional by the Supreme Court of that State.

The Grand Lodge of the Switchmen's Mutual Aid Association has decided that members must participate in the insurance department of the association.

A mail clerk of Greenwich, Conn., has been arrested for riding on the New York, New Haven & Hartford for more than a year on a pass, the date of which he had altered.

The Indiana law of 1891, providing for the appraisal of railroad property by a State Board for that special class of property, has been sustained by the Supreme Court of the United States.

The appropriation bill now before Congress for the Agricultural Department has a clause authorizing the Department, in conjunction with the Post Office Department, to have weather signals displayed upon the cars of mail trains. These signals have been used in Canada several years.

The Supreme Court of the United States has decided that the United States has no interest in the property known as Fort Dearborn, on the lake front at Chicago. This decision favors the Illinois Central, chiefly by compelling the city of Chicago to fight its own battles. This branch of the "Lake Front case" will now have to be tried over again.

The Atchison, Topeka & Santa Fe suspended over 300 men from the shops in Topeka last week, in consequence of the dullness of business. The Chicago, Rock Island & Pacific has reduced the time in its car-shops to 40 hours a week. The Toledo, Ann Arbor & North Michigan has put its shops on half time. The Juniata shops of the Pennsylvania, at Altoona, have resumed full time.

In the course of a lawsuit lately heard at White Plains, N. Y., it appeared that Mrs. Homer R. Baldwin, who was injured in the rear collision at Hastings, N. Y., on Dec. 24, 1891, received \$32,300 from the New York Central in settlement of her claim for damages. Mrs. Baldwin suffered the loss of her left hand, and part of the right, and lost both eyes, in addition to sustaining other serious injuries.

The constitutionality of Section 12 of the Inter-State Commerce law was affirmed by the Supreme Court of the United States on May 6, in an opinion by Justice Harlan. The case was that of appeal to the Commission from the judgment of the United States Circuit Court (Judge Gresham), in which it refused to aid by the judicial process of that court in enforcing an inquiry instituted by the Commission.

Mr. M. Towle, of Hammond, Ind., has sued the Chicago & Erie for \$50,000 damages because his side lost the Congressional nomination in his district. It appears that he ordered a special train to run from Hammond to a convention at Crown Point, but that a crowd of his rivals boarded the train and filled the cars, and that then the conductor started, so that Towle and his friends were left and were unable to reach the convention that night.

The "Borden Mineral Land case," which involves title to a large quantity of land claimed as a part of its grant by the Northern Pacific, has been decided by the United States Supreme Court against the contention of the roads that the exemption of lands containing minerals (gold and silver) made in the grant was limited to lands which were known to contain these minerals at the date of the act or location of the line of the road. Justices Brewer, Gray and Shiras dissented.

The men who stole a Union Pacific train at Montpelier, Idaho, were sentenced by Judge Riner, at Cheyenne, on May 23. The three leaders were imprisoned for five months, and twelve others for four months. A band of about fifty tramps tried to seize a train near Beckwith, Idaho, on the same day. The employees of the Chicago, Rock Island & Pacific, in Lincoln County, Col., have been commissioned as special deputy sheriffs, and, according to the reports, they will be armed.

According to the Chicago papers the employees of the Pullman car shops, who recently struck, are in destitute circumstances, hundreds of dollars' worth of provisions being contributed by benevolent persons for their support every few days. The latest sensation published by their leaders is that the trainmen of the Chicago, Milwaukee & St. Paul will aid them by refusing to handle Pullman cars. This road runs sleeping cars of its own, and, if we remember correctly, hauls no Pullman cars whatever; which would seem to make this news valuable chiefly as a joke.

At Enid, Oklahoma, on May 21, two policemen were killed by brakemen of the Chicago, Rock Island & Pacific Railroad, in a fight which ensued on the attempt of the policemen to arrest the train crew for running faster than six miles an hour within the city limits. The officers fought with revolvers, and the trainmen with coupling pins. It seems to have been a very brutal affair, three of the officers having been carried off in the caboose when the train unexpectedly started. The fight was continued, but the officers were overpowered and put off the train at the next station.

The suit of the Old Colony Railroad to collect 15 cents from a passenger who refused to pay fare because he could not get a seat, has caused a good deal of discussion at Boston, where the Superior Court decided last week in favor of the company; but it appears that the chief reason why the passenger lost his case, was that he boarded the train at Boston two minutes before the time for its departure, and at once went through all the cars, and there fore knew, before the train started, that every seat was full. As he might have left the train, it was therefore held that, in deciding to remain, he elected to ride standing. He says he will carry the case to the Supreme Court.

The Mayor of Boston has written the street commissioners asking them to make an estimate of the cost of abolishing all the grade crossings in East Boston. The streets are 15 in number and comprise Marginal, Webster Sumner, Maverick, Decatur, Porter, Marion, Brooks, Putnam, Prescott, Parkway, Bennington, Saratoga and Byron. If the scheme is successfully carried out, it will be of great benefit to East Boston, and will make available large tracts of land now consisting of flats. The tracks of the Boston & Maine and of the Boston & Albany extend diagonally across the island on which East Boston is situated, from the wharves to Byron street, a distance of about three miles.

At the recent convention of railroad surgeons it was stated that railroads cared for nearly 40,000 sick and injured persons during the last year, in many cases contributing also to the support of their families during the time of their disability. The following table was read before the convention:

	No. 17,088	No. sur-miles, 1,391
Railroads without a surgical service		
Railroads with a surgical service and no chief surgeon	35,138	1,391
Railroads with a surgical service and chief surgeon	45,281	1,882
Railroads with relief system	13,446	691
Railroads with a hospital system	36,751	1,502
Totals	147,704	5,466

It was reported that many of the delegates to the Populist State Convention, at Indianapolis, last week, would travel in farm wagons in order to show their hostility to the railroads. Whether the intention was actually carried out by delegates living far from the city we have not heard, but the idea seems to be popular on paper whether it is so in actual life or not, for the State Central Committee of the Populist party in Arkansas has already advised the delegates to the convention in that State, which will be held on July 19, to start 10 days beforehand and travel either in wagons on horseback, or on foot. There seems to be in the minds of the committee some hope that a little profit can be made out of "gate money" as the "army" is instructed to make stops at the principal towns.

At Charleston, S. C., on May 21, Judge Simonton filed a decision in the railroad tax cases on a suit brought by the Attorney-General of the State to force the Richmond & Danville to pay the various county treasurers the unpaid balances due on the taxes, and the penalties and costs thereon. The suit brought by the railroads to restrain the county officials from collecting the taxes, on the ground of excessive assessments, was decided against the plaintiffs, whereupon most of them paid the taxes. Among those which refused to pay was the Richmond & Danville, and the suit just decided was brought to force the collection. In the decision Judge Simonton orders "that the receivers pay the penalty on all balances of taxes unpaid, and that they do not pay any costs of levy on any property in their hands as receivers."

The committee of three Congressmen, who went to Milwaukee to investigate the conduct of Judge Jenkins, after he had issued an injunction forbidding Northern Pacific employees to strike, have drafted bills to be presented in Congress, regulating the practice of the courts in punishing contempt of court. Their aim is to limit the fine and term of imprisonment, in such cases as that which called out the investigation, to \$250 and 48 hours, respectively. They have also prepared another bill providing that no Judge of any Court of the United States shall enforce, or attempt to enforce, the performance of any labor contract, or contract expressed or implied, for continuous personal service, by the writ of injunction, or any other legal process whatever: Provided, That the right of action at common law for damage for breach of such contracts is not hereby abridged.

Who Rides Second Class.

Traveling in a second-class carriage, a gentleman had a small misunderstanding with a lady in reference to the opening of a window. "You don't appear to know the difference between second and third class," the lady said cuttingly. "Oh, madam!" he replied, "I am an old railway traveler. I know all the class distinctions. In the first class the passengers behave rudely to the guard; in the third the guards behave rudely to the passengers; in the second (with a bow to his fellow-passenger) the passengers behave rudely to each other."—London *Tit-Bits*.

South American Notes.

Sr. E. Arevalos petition for a subsidy from the Argentine government, for a new line of steamships between Buenos Ayres and New York, has been reported upon unfavorably by Dr. Carles, Argentine Postmaster-General, who stated that the mails from that republic to the United States during 1893, embraced only 46,000 letters, involving a cost for transportation of \$2,200 gold. The subsidy asked for was \$147,000.

The Uruguayan railroads seem to be embarrassed in the same manner as those in Argentine, by excessive consignments of wheat. Buildings of all sorts belonging to the railroads, including engine houses, car sheds, and repair shops, are being utilized to store grain pending shipment, and still the space is inadequate.

The Southern Brazilian Rio Grande do Sul Railway has suffered from the revolution, chiefly by damage to permanent way. The traffic during the year 1893 was only slightly diminished, but the result of the year's working was a loss of \$50,000. The indications are that the road will more than cover its operating expenses in the current year. The length of line now open is 175 miles.

"American Bluff" and "Insular Conceit."

We find in *Transport*, a weekly journal published in London, the following concerning the Cramps' offer to build ships for the British navy:

"American newspapers are so fond of humbugging their readers, and American readers are so fond of being humbugged by their newspapers, that the appearance of the following telegram from Philadelphia was accepted here as a specimen of the humor which is current in the big dailies on the other side of the Atlantic: 'President Cramp, of Messrs. Cramp & Sons, shipbuilders, announces that he has proposed to the British Admiralty to bid for the construction of some of the new ships to be built for the British Navy under the programme for the current year.' The whole affair was regarded as a joke on the part of a correspondent, but the joke has really been provided by Mr. Cramp for the benefit of our Admiralty officials. The head of the Philadelphia shipbuilding firm has actually addressed a letter to the British Admiralty; and for an excellent example of American bluff—I will characterize it by no harsher term—I commend it to the attention of my readers." Then follows Mr. Cramp's letter. But why should the Cramps not build ships for England?

Swiss Railroads.

At the close of 1893 there were in operation in Switzerland, 2,221 miles of railroads, of which 1,860 miles were standard gage and 277 miles narrow gage; there were 48 miles of rack railroads, 26 miles of street railroads, and 10 miles of cable roads. There were under construction 156 miles of railroads. On the 5 principal lines 41 per cent. of the ties are of iron, 14 per cent. of oak and 45 per cent. of other woods. Of the rails 75 per cent. are of steel and 25 per cent. of iron. The rolling stock consists of 932 locomotives, 6,417 passenger cars, 1,263 baggage and mail cars, and 1,887 freight car axles; the cars, which have partly two, partly three axles, being counted thus. Eighty-five per cent. of the locomotives, 67 per cent. of the passenger cars and 78 per cent. of the baggage and mail cars are equipped with continuous brakes, and 59 per cent. of the cars are heated by steam.

In the latter part of last year a conference took place between the Jura Simplon railroad and the contractors of the projected Simplon Tunnel, at which it was resolved to submit the new plans to an expert examination. The following committee was appointed for this purpose: Mr. G. Colombo, of Milan, Mr. Francis Fox, of London, the builder of the Mersey Tunnel, and Mr. K. J. Wagner, of Vienna, formerly Division Engineer of the Arlberg Tunnel.

CAR BUILDING.

In addition to the 100 refrigerator cars now being built by the Wells & French Co. for the California Fruit Transportation Co., it is probable that the order will be duplicated soon. Notice of the letting of the first contract was given in the *Railroad Gazette* of March 2 last. The specifications were for Sharon cast steel bolster, Hutchins roof and insulation, wooden brake beams, Wells & French Contracted Chilled wheels, miners' draft rigging. The cars that are now being completed have a very attractive appearance.

BRIDGE BUILDING.

Altoona, Pa.—As a result of the late flood, some 118 county bridges have been destroyed and will have to be rebuilt. Thirteen are in Frankstown Township; two near Stiffer Station; one in Logan Township; one in Woodbury Township. Two new bridges are now being erected at Kladden Station and McCuen's Mills.

Baltimore, Md.—The ordinance appropriating \$17,000 for an iron foot bridge over Jones Falls and the tracks of the Northern Central, has been indefinitely postponed.

Bellefonte, Pa.—The Lamb street bridge was so damaged by the late flood as to necessitate the erection of a new structure. The large iron bridge and several small ones at Spring Mills were also destroyed.

Brooklyn, N. Y.—The proposal to construct a second bridge over Newtown Creek, at Manhattan avenue, advocated by citizens of the Seventeenth ward, has been formally brought to the attention of Mayor Schieren, who favors the project.

Brookville, Pa.—The Allegheny Valley railroad bridge near the Brookville station, and the bridge at Heathville were destroyed by the late flood. Both will be replaced at once.

Caldwell, Tex.—Sealed proposals will be received by T. M. Hunt, of Caldwell, for the Commissioners' Court of Burleson County, up to June 20, for the erection of an iron bridge over Second Creek on the Caldwell & Giddings Road, and about four miles from the railroad depot, the bridge to be of one span between 40 and 50 ft.

Camden County, Pa.—Three iron bridges will be built by the County Commissioners shortly, one at Spangler, one at Nantyglo, Blacklick Township, and one at Elton, in Adams Township.

Cambridge, Md.—The county commissioners of Dorchester county have asked for proposals for the construction of an iron bridge across Cambridge Creek. The plans and specifications have been prepared by Charles H. Latrobe, of Baltimore. The structure will cost about \$12,000.

The contract for the construction of a 90-ft. span bridge across Cedar River at Cedar Mountain, has been awarded by the board of county commissioners to Messrs. Brown Bros. for \$690.

Camden, N. J.—The Board of Freeholders has awarded the contract to Sweeten & Son for the construction of a bridge over Newton Creek, at Champion Road, at a cost of \$1,628. They have also voted an appropriation of \$10,000 for new bridge work in their districts.

Cohoes, N. Y.—The Hilton Bridge Co., of Albany, is erecting an iron bridge on Cortlandt street in this city.

East Liverpool, O.—As noted last week, Gen. Casey, chief of engineers, has appointed a board of engineer officers to examine the plans of the new highway and street railroad bridge over the Ohio River at that point, to be built by the East Liverpool & West Virginia Bridge Co. The bridge will be of steel 1,700 ft. in length, in three main spans, with approaches. The channel span will be 525 ft. long, and the others about 400 ft. each. It is estimated to cost \$500,000. Mr. J. E. MacDonald represents the syndicate which is to build the bridge. On the West Virginia side, the property owners have raised \$25,000 bonus for the company. The plans were made by Mr. J. G. Kerry, of Montreal, Can., who is now in East Liverpool. Among others interested in the enterprise is Mr. A. Johnson, of Cleveland, Ohio, the head of the street railroad between East Liverpool and Wellsville, Ohio, which is to cross the bridge.

Fairmount, W. Va.—The local development company has appropriated \$12,000 for a 400-ft. steel bridge over Coal Run, connecting its land with the town. The structure is 98 ft. high.

Huntingdon, Pa.—Comparatively new iron bridges at Mapleton, costing \$13,000; west of Mill creek, costing \$14,000; and at Weaver's, over the Raystown branch of the Juniata, costing \$6,500, were destroyed by the late flood, as were also the \$6,000 bridge at Fink's Crossing and two township bridges at Mapleton. Their rebuilding will cost the county over \$40,000.

Johnstown, Pa.—The Youngstown (O.) Bridge Co. has been directed to repair the damaged Portage and Lincoln streets bridges. The Mayor has been instructed to act in conjunction with the committees of East Conemaugh and Franklin Boroughs to confer with corporations that will be benefited by the erection of a bridge across the Conemaugh in the upper end of the Eleventh Ward.

Mayfield, Pa.—In 1891 the Borough authorities were temporarily enjoined from building a 60-ft. iron bridge, to cost about \$6,000, over the Lackawanna River at this point. Last week, Judge Edwards finally dissolved the injunction and the Borough can now build the bridge. For this purpose a tax of 5 mills will be levied.

Noxen, Pa.—The Lehigh Valley bridge at this point was destroyed by the late flood and will be replaced.

Philadelphia.—The bill to authorize the Pennsylvania & New Jersey Railroad Company to construct and maintain a railroad bridge over the Delaware River at Roxborough street, Philadelphia, passed the United States Senate last week and now goes to President Cleveland. This company was recently organized by officers and directors of the Pennsylvania Railroad.

Pittsburgh, Pa.—A petition will shortly be presented to the county commissioners asking for the erection of a bridge across the Ohio River to connect Sewickley and Coraopolis.

Pottsville, Pa.—Seventeen bids were received by the county commissioners for the erection of one new bridge at Girard, and the repairing of those at Rupert and Biddle, as follows: Charles Gerhardt, Philadelphia, \$2,987; Charles A. Meek, Schuylkill Haven, \$2,162; James Bartlett, Friedensburg, \$2,084; George T. Bickel, Ashland, \$3,089; John Conrad, Port Carbon, \$3,335; Adam Waldner, Ashland, \$2,600; Kudel & Hipple, \$2,800; N. Brenner, Pinegrove, \$2,140; Rarig & Laudig, Ringtown, \$2,087; J. B. Urich, Tamaqua, \$1,911; Charles Teckentin, \$2,032; J. B. Kester, Ringtown, \$3,470; A. B. Neugard, Barry (two bridges), \$2,080; W. J. Clark & Co., Pottsville, \$1,954; P. J. O'Neill, Port Carbon, \$2,214; Schneider & Maurer, Ashland, \$2,550; A. S. Forry, Pottsville, \$2,370. J. B. Urich was awarded the contract.

Rochester, Pa.—Because there exists a general law for bridges over the Ohio River, the United States Senate Committee on Commerce has reported adversely the bill for a bridge across that river at Rochester, Pa.

Salisbury, Pa.—Citizens of Salisbury and Elk Lick Townships have petitioned for a new bridge over the Caselman River at Salisbury.

Selin's Grove, Pa.—The commissioners of Snyder County, Pa., are making preparation to rebuild the four county bridges destroyed by the high water.

Sugar Grove, Pa.—The borough officials completed a contract last week with the Canton Bridge Co., of Canton, O., for putting in a steel bridge, to be completed by August 25. It will take the place of the old stone structure washed out by the late flood.

Swedesboro, N. J.—The special committee appointed by the Gloucester County Board of Freeholders to examine the old bridge at Swedesboro, over Raccoon creek, have condemned the bridge, and will shortly commence the erection of a more substantial structure to take its place. The new bridge is to be of iron, and will be 60 ft. long and 44 ft. wide.

West Chester, Pa.—The county commissioners will be asked to build a bridge over Beaver creek at Bondsville.

Williamsport, Pa.—Lycoming County lost six bridges in the late flood, representing an outlay of over \$175,000. Besides the Market street and Maynard street bridges, the Muncy bridge went out. That part of the Jersey Shore bridge next to the town was washed away. At Fields, the bridge across Lycoming creek was swept away and the center pier of the double bridge was washed out and one span of the bridge fell, and the other was badly warped. The double bridge on Lycoming creek between Perryville and Cogan station was also destroyed. Representatives of a number of bridge building firms are now in the city preparing bids for rebuilding these bridges.

Wood County, W. Va.—At the last session of the County Court of Wood County, held at Parkersburg, the contracts were let to the Wrought Iron Bridge Co., of Canton, Ohio, for the construction of three new highway bridges at various points in Wood County. One is to cross Badgley's Fork, in Tygart district, and will be 26 ft. long and 18 ft. wide. One crosses Sam's Creek, in the same district, and will be 40 ft. long and 18 ft. wide. The other crosses Stillwell Creek, in Walker district, and is also 40 ft. long and 18 ft. wide. The contract price was \$1,875.

MEETINGS AND ANNOUNCEMENTS.**Dividends.**

Dividends on the capital stocks of railroad companies have been declared as follows:
Columbus, Hocking Valley & Toledo, 2½ per cent. on the preferred stock, payable June 22.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Canada Southern, annual, St. Thomas, June 6.
Chicago Junction Railway & Union Stock Yards Co., annual, Jersey City, N. J., June 5.
Chicago, St. Paul, Minneapolis & Omaha, annual, Hudson, Wis., June 9.
Des Moines & Fort Dodge, annual, Des Moines, Ia., June 7.
Duluth, South Shore & Atlantic, annual, Marquette, Mich., June 7.
East Barre & Chelsea, East Barre, Vt., June 4.
Great Northwest Central, annual, Ottawa, Ont., June 5.
Keokuk & Des Moines, annual, Des Moines, Ia., June 6.
Michigan, Midland & Canada, annual, Detroit, Mich., June 7.
Minneapolis, St. Paul & Sault Ste. Marie, annual, Minneapolis, Minn., June 5.
St. Joseph & Grand Island, annual, Elwood, Kan., June 12.
St. Louis, Alton & Terre Haute, annual, St. Louis, Mo., June 4.
Toledo, Canada Southern & Detroit, annual, Detroit, Mich., June 7.
Vermont & Massachusetts, annual, Boston, Mass., June 6.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *Master Car Builders' Association* will hold its annual convention at Saratoga, N. Y., beginning June 12. The hotel headquarters will be at Congress Hall, H. S. Clements, Manager.

The *Master Mechanics' Association* will hold its annual convention at Saratoga, N. Y., beginning June 18.

The *National Association of Local Freight Agents* will hold its annual convention at Pittsburgh, Pa., June 12, 13, 14. The headquarters will be at the Monongahela House.

The *International Association of Car Accountants* will hold its annual convention at Old Point Comfort, Va., beginning June 19.

The *American Society of Mechanical Engineers* will hold its annual convention in Montreal, Can., from June 4 to 9. The headquarters will be at the Windsor Hotel. The sessions of the society will be held in the Engineering Building of McGill University.

The *Western Railway Club* meets in the rooms of the Central Traffic Association, Monadnock Building, Chicago, on the third Tuesday in each month, at 2 p. m.

The *New York Railroad Club* meets at the rooms of the American Society of Mechanical Engineers, 12 West Thirty-first street, New York city, on the third Thursday in each month, at 8 p. m.

The *New England Railroad Club* meets at Wesleyan Hall, Bromfield street, Boston, Mass., on the second Wednesday of each month.

The *Central Railway Club* meets at the Hotel Iroquois, Buffalo, N. Y., on the fourth Wednesday of January, March, April, September and October.

The *Southern and Southwestern Railway Club* meets at the Kimball House, Atlanta, Ga., on the third Thursday in January, April, August and November.

The *Northwestern Railroad Club* meets at the Ryan Hotel, St. Paul, on the second Tuesday of each month, at 8 p. m.

The *Northwestern Track and Bridge Association* meets at the St. Paul Union Station on the Friday following the second Wednesday of March, June, September and December, at 2.30 p. m.

The *American Society of Civil Engineers* meets at the House of the Society, 127 East Twenty-third street, New York, on the first and third Wednesdays in each month, at 8 p. m. The annual convention will be held at the Cataract House, Niagara Falls, N. Y., beginning June 20.

The *Western Society of Engineers* meets on the first Wednesday in each month, at 8 p. m. The headquarters of the society are at 51 Lakeside Building, Chicago.

The *Engineers' Club of Philadelphia* meets at the House of the Club, 1122 Girard street, Philadelphia, on the first and third Saturdays of each month, at 8 p. m.

The *Boston Society of Civil Engineers* meets at Wesleyan Hall, 36 Bromfield street, Boston, on the third Wednesday in each month, at 7.30 p. m.

The *Engineers' Club of St. Louis* meets in the Missouri Historical Society Building, corner Sixteenth street and Lucas place, St. Louis, on the first and third Wednesdays in each month.

The *Engineering Association of the South* meets on the second Thursday in each month, at 8 p. m. The Association headquarters are at The Cumberland Publishing House, Nashville, Tenn.

The *Engineers' Society of Western Pennsylvania* meets in the Carnegie Library Building, Allegheny, Pa., on the third Tuesday in each month, at 7.30 p. m.

The *Technical Society of the Pacific Coast* meets at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., on the first Friday in each month, at 8 p. m.

The *Association of Engineers of Virginia* holds informal meetings on the third Wednesday of each month, from September to May, inclusive, at 710 Terry Building, Roanoke, at 8 p. m.

The *Denver Society of Civil Engineers* meets at 36 Jacobson Block, Denver, Col., on the second and fourth Tuesdays of each month except during July, August and December, when they are held on the second Tuesday only.

The *Montana Society of Civil Engineers* meets at Helena, Mont., on the third Saturday in each month, at 7.30 p. m.

The *Engineers' Club of Minneapolis* meets in the Public Library Building, Minneapolis, Minn., on the first Thursday in each month.

The *Canadian Society of Civil Engineers* meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alternate Thursday, at 8 p. m.

The *Civil Engineers' Club of Cleveland* meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month, at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month.

The *Engineers' Club of Cincinnati* meets at the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati, O., on the third Thursday in each month, at 7.30 p. m.

The *Engineers' and Architects' Club of Louisville* meets in the Norton Building, Fourth avenue and Jefferson street, on the second Thursday in each month, at 8 p. m.

The Engineers' Club of Kansas City meets in Room 200, Baird Building, Kansas City, Mo., on the second Monday in each month.

The Civil Engineers' Society of St. Paul meets on the first Monday of each month.

The Scandinavian Engineering Society of Chicago meets in Room 309, Title and Trust Building, 100 Washington street, on the third Thursday in each month.

The Foundrymen's Association meets at the Manufacturers' Club, Philadelphia, Pa., on the first Wednesday in each month.

Engineers' Society of Western Pennsylvania.

The regular monthly meeting of the Engineers' Society of Western Pennsylvania was held in Carnegie Lecture Hall, on May 7. The discussion of Mr. Thomas H. Johnson's paper regarding the Theory of Dynamic Work applied to Static Forces was continued with much animation. Prof. Mansfield Merriman's views on the subject were presented in a paper prepared and forwarded by him. A very interesting paper on Smoke Prevention by the use of Producer Gas, by Mr. Blauvelt, of Philadelphia, was read and elicited considerable discussion. A paper on the Determination of Arsenic in Lead Base Bullion, was presented by Mr. John E. Williams, at the meeting of the Chemical Section, which was held on May 18.

Engineers' Club of St. Louis.

At the meeting of May 16, President Crosby called the club to order, nineteen members and seven visitors present. The Executive Committee recommended Eugene J. Spencer and E. P. Fiedericks for election to membership, and they were elected. An application for membership was announced from Geo. W. Sterne. Mr. T. L. Condon then read a paper on "Punching as a Means of Testing Structural Steel," presenting the results of nearly 600 punching tests made at the Washington University testing laboratory. The effects of punching were illustrated by specimens, and by lantern slides, showing photographed sections of plates. Mr. Condon had made earlier studies of this subject at Pittsburg and Terre Haute, and had been assisted in his investigations by Prof. J. B. Johnson and Messrs. Harrington and Norton, students of Washington University, who were preparing graduation theses on the subject. The author was not prepared, however, to draw any definite or general conclusions from his investigations, as yet, but promised a further report to the club. A paper by Mr. David Molitor on "The Distortion of a Framed Structure Graphically Treated," was read by title.

Association of Engineers of Virginia.

The regular monthly meeting of the Association was held May 16, with the President, Mr. Charles S. Churchill, in the chair. The subject of "Photochromy, or The Reproduction of Colors by Photography," was presented by Mr. Rene de Saussure. After a brief account of partially successful attempts to bring out colors by the use of colored screens, Mr. de Saussure gave an interesting description along with a demonstration of the scientific theories involved in the latest and successful effort of a French scientist who has reproduced the exact colors of the object on the plate. These colors, however, cannot be transferred by printing. The only difference between this process and that ordinarily used is the finer preparation of the plates and the introduction of a mirror in the camera immediately behind the plate. The principles involved are the relative lengths of the waves of light for the different colors and the interference produced by the reflected rays acting with the direct rays of light. The process is a very fine demonstration of the correctness of the wave theory of light, as the whole process is worked out on that theory as a basis. The one drawback to the colored photographs coming into common use is that the plates have to be extra fine and sensitive, and have to be used within a day or two after they have been prepared and so cannot be put on the market for sale.

The Board of Directors have decided to hold the Summer meeting on Saturday, July 14, at Alleghany Springs, Va.

New England Water Works Association.

The programme of the thirteenth annual convention of this association has been issued. The meetings will be held in the United States Hotel, Boston, on June 14, 15 and 16. An exhibit of water works supplies is being arranged by Mr. Harold L. Bond, of 57 Oliver street, which, it is believed, will prove a valuable and interesting feature of the meeting. The sessions are to be held at 10.30 a. m., 2.30 p. m. and 7.30 p. m. on Thursday, for organization, reports of committees and reading and discussion of technical papers. On Friday, after the morning meeting at 9.30 a. m., there will be an excursion starting at 11 o'clock to points of interest connected with the Boston, Newtown and Brookline Water System. The final session will be held on Friday evening at 7.30, when Mr. E. D. Leavitt, Mechanical Engineer of Cambridge, Mass., will read a paper on the "Latest Improvements in Pumping Machinery." For Saturday morning a sail to points of interest in Boston Harbor has been arranged for. George E. Batchelder, of Worcester, Mass., is President of the association, and Mr. R. C. Cogeshall, of New Bedford, Mass., is the Secretary.

Engineering Association of the South.

About a dozen and a half of the members of the association left Decatur, Ala., on May 12 to inspect the Mussel Shoals Canal through the courtesy of United States engineers in charge of that improvement. A canopied barge had been provided for the members which was pushed in front of the steamer and with a perfect day those who made the trip found it most enjoyable. After passing through the Elk River Shoals Canal and inspecting the lock at that point, the boat passed on to the head of the Big Mussel Shoals Canal. Here the party disembarked and were led to a train consisting of one small engine and a unique car ahead of it. The car had wooden truck frames, no springs and was canopied with canvas. The track upon which this train ran is 48 inch gage, and is used in towing the boats through the canal by locomotives. The ride was delightful, stops being made at all locks, bridges, aqueducts or other places of interest. At Lock No. 6, the engineers' headquarters, the party made a long halt and ate lunch under the shade trees in the grove surrounding the residences of the engineer officers. After lunch the quarters of the men and the shops were inspected. The party then proceeded to Lock No. 9, the last lock of the Middle Division. Returning, a stop was made at the aqueduct, the water having been withdrawn, affording a perfect view of its construction. Further on another stop was made at the great dredge, which was in full operation, lifting the slit up with an endless chain of buckets and sluicing the same through a long pipe entirely over the wall of the canal. Mr. W. A. McFarland, Assistant United States Engineer, accompanied the party and explained the various features of the work.

PERSONAL.

—Mr. Stewart Johnson has been chosen General Manager of the Consolidated Street Railroad in Grand Rapids, Mich., and will resign as Chief Engineer of the Grand Rapids & Indiana Railroad to accept that position.

—Mr. E. B. Sanborn, of Franklin, N. H., has been appointed State Railroad Commissioner of New Hampshire, vice Col. Thomas Cogswell, resigned. Mr. Sanborn is a lawyer and has served a former term upon the State Railroad Commission.

—Mr. T. H. Fennell, formerly General Superintendent of the Northern Division of the Lehigh Valley road at Buffalo, has been appointed Superintendent of the Western Division of the New York & New England, succeeding Mr. H. J. Quigg, resigned.

—Mr. Luther Kendall Jewett died at his home in Boston, May 14. He was the inventor of the Jewett truck and Jewett composite car framing, also of a roller side and center bearing, and by these inventions contributed much to improving railroad working.

—Mr. W. H. Owens, Master Mechanic of the Georgia Pacific Railroad, has been appointed General Master Mechanic of the Richmond & Danville road, with headquarters at that company's general shops at Manchester, Va. The appointment is effective June 1.

—Mr. W. L. Tracey, who has been foreman of the machine shops of the Richmond & Danville, at Alexandria, Va., has been appointed Acting Master Mechanic at Birmingham, Ala., to succeed Mr. Owens. Mr. Owens has been Master Mechanic of the Georgia Pacific for nearly four years. Before his transfer to Birmingham, Mr. Owens was foreman of the shops at Manchester.

—Mr. D. B. Smith, who has been General Manager of the Mexico, Cuernavaca & Pacific Railroad, has resigned that office. Mr. J. H. Hampson, President of the company, will operate the railroad as General Manager. Mr. Smith now has charge of the building of the extension of the Pecos Valley Railroad in New Mexico, the contract for which has been taken by Mr. Hampson.

—Mr. Samuel C. Hoge, Superintendent of the Macon & Northern, has resigned that office to accept an appointment as Superintendent of the Main Steam Division of the Central of Georgia. Mr. Hoge was formerly connected with that company, but has been Superintendent of the Macon & Northern since March, 1893. He succeeds Mr. W. A. Moore, who it is understood goes to a Northern road.

—Mr. James H. Barrett, who has been General Superintendent of the Buffalo, Rochester & Pittsburgh since 1892, has resigned. It is announced that he is to be at the head of the operating department of one of the railroads in Ohio. Mr. Barrett was formerly on the New York, Lake Erie & Western, first as Superintendent of the Eastern Division in 1886, and as Superintendent of Transportation in 1888, and as General Superintendent in January, 1891, holding the latter position until May, 1892.

—General Superintendent H. R. Nickerson of the Santa Fe Line has resigned his position and will leave Topeka, Kan., June 10, to become Assistant General Manager of the Mexican Central road, with headquarters in the City of Mexico. Mr. Nickerson has been General Superintendent of the Atchison road for three years. He was General Superintendent of the lines east of the Missouri River before that, and was Division Superintendent in Kansas for over 10 years, up to 1890. He has been connected with the Atchison road continuously since 1892.

—Mr. C. C. Harvey, heretofore Vice-President of the New Orleans & Northeastern, Alabama & Vicksburg and Vicksburg, Shreveport & Pacific Railroad Companies, part of the Queen & Crescent system, has been elected President of those companies. Mr. Charles Schiff, the former President, accepting the position of Vice-President. This change was made at the instance of Mr. Schiff. When he returned to England about three years ago he remained President of the three companies mentioned, with the intention of coming to this country frequently to look after their interests, but his business in London has made this impossible.

ELECTIONS AND APPOINTMENTS.

Alliance & Northern.—At a meeting of stockholders, of this company at Alliance, O., at which 3,500 out of 5,000 shares were represented, the following officers were elected: Morton S. Paton, of New York, President; T. F. Hicks, New York, Vice-President; F. H. Smith, Jr., Newark, N. J., Secretary and Treasurer; Edwin E. Scranton, Alliance; General Manager; Directors, D. B. Chambers, Cleveland; Morton S. Paton, New York; E. E. Scranton, Alliance; William B. Sanders, Cleveland; F. H. Smith, Jr., Newark, N. J.; T. F. Hicks, New York, and Harvey H. Brown, Cleveland.

Burlington, Cedar Rapids & Northern.—The seventeenth annual meeting was held at Cedar Rapids, Iowa, May 22. Thomas Hedge, George W. Cable, J. Carscadden and C. J. Ives were reelected directors. The directors then chose the following officers: Executive Committee, R. R. Cable, J. P. Presely, Chicago; J. W. Blythe, Burlington; W. G. Purdy, Chicago; C. J. Ives, Cedar Rapids. Officers, R. R. Cable, Chairman of the Board; C. J. Ives, President; Robert Williams, Vice-President; H. H. Hollister, Treasurer; S. S. Dorwart, Secretary; J. C. Broecksmitt, Auditor.

Decatur & Eastern.—The stockholders of this road, formerly the Indianapolis, Decatur & Western, met at Decatur, Ill., on May 17, and elected R. B. F. Pierce of Indianapolis, General Manager, and William H. Mason, of Indianapolis, temporary President.

Great Northern.—R. I. Farrington, Auditor of Disbursements, has been appointed to the additional office of Assistant Controller, with headquarters at St. Paul.

Monterey & Mexican Gulf.—J. P. Flynn, Superintendent of Transportation of the railroad, has resigned, and that office will be abolished.

New York & New England.—T. H. Fennell has been appointed Superintendent of the Western Division, with headquarters at East Hartford, Conn., vice H. J. Quigg, resigned, effective June 1.

Oklahoma Central.—The directors of this company, reported last week as having been organized in Kansas, has the following directors: H. Stout, Arkansas City, Kan.; C. M. Bay, Kingman, Kan.; G. G. O'Neal, Parker, Oklahoma; E. S. Parker, New York City; W. N. Brayton, Parker, Oklahoma; L. F. Hoops, Arkansas City, and C. M. McLellan, Tulala, I. T.

Palisades.—The following are the officers of this company, which has recently built a road from near Guttenberg to Fort Lee, N. J. President, George S. Coe, No. 128 Broadway, New York city; Vice-President, William E. Bond, No. 2 Wall street, New York city; Secretary, Frank L. Hall, No. 62 William street, New York city. Communications in regard to the railroad should be addressed to the Secretary.

South Jersey.—H. Milton Kennedy, of Cape May, N. J., who has been acting as Excursion Agent, has been appointed General Passenger Agent.

RAILROAD CONSTRUCTION, Incorporations, Surveys, Etc.

Atlantic & Danville.—The recent purchase of this property at foreclosure sale at Danville, Va., was made by Mr. B. E. Newgass, a banker of London, Eng. He has recently completed an inspection of the railroad, and before leaving Danville announced that an important extension had been decided upon. The length of the new road or the direction, he declined to state. The property is still being operated by A. B. Thorn as Receiver, pending the organization of the new company.

Attica & Freedom.—F. H. Goodyear, the Buffalo lumberman, and one of the proprietors of the Buffalo & Susquehanna Railroad, some weeks ago made a proposition to reconstruct this line south of Attica, N. Y., and place it in operation. His plans depended upon the towns along the railroad subscribing about \$100,000 in the bonds of the company, to be issued to secure part of the funds for the reconstruction of the line. Mr. Goodyear has now withdrawn his proposition, having decided not to purchase the property.

Bedford & Blair County.—Work was resumed on the line May 28, having been retarded by the storm, which damaged the right of way very little. Some 300 men have been put on between Brook's Mills at Cessua, and this force will be increased shortly. This is the section already graded. E. A. Tennis, of Thompsonstown, Pa., is the contractor. George B. Orady, Esq., of Huntingdon, Pa., is President of the company, and J. Murray Africa, of Huntingdon, is Chief Engineer. The ungraded portion of the line is between Osterburg and Reitz, in Somerset County, Pa., 18 miles. The line will develop coal and timber lands.

Buffalo, Rochester & Pittsburg.—A survey is soon to be made by the engineers of the company, for the proposed new branch from Pike Station to the village of Pike, N. Y., a distance of about four and a half miles. The company now hauls gravel ballast for this part of its line from near Rochester, over 50 miles, and the construction of the branch is undertaken to reach good gravel beds near Pike Village.

Choctaw Coal & Railroad Co.—Another effort was made last week to arrange for the construction of the middle section of the road connecting the Eastern and Western sections now in operation. A syndicate has been formed to build this section, agreeing to accept the receiver's certificates in payment. The proposition of this syndicate was discussed at a meeting of the creditors last week at the office of Receiver F. I. Gowen in Philadelphia. The plan, however, was not agreed to in all particulars. When the conditions to which objection is made have been revised, the proposition will again be laid before the creditors for approval. The connecting line which it is proposed to build, is 120 miles long from Oklahoma City to South McAlester.

Columbus, Hocking Valley & Athens.—Papers are being prepared to be filed in the courts at Columbus, O., asking for an injunction against the State of Ohio carrying out the contract created by the law just passed by the Legislature, to lease the Hocking canal bank to this company for a railroad right of way to the coal fields, for 99 years. It is understood that W. C. Lemert, of the Chicago, Columbus & Southeastern, which was a contestant for the right of way, will file the suit, which will claim that the State cannot abandon its canals without first obtaining consent from the United States Government, which gave these lands for canal purposes exclusively.

Corsicana & Southeastern.—The members of the Commercial Club of Corsicana, Tex., have accepted the proposition of G. W. Coykendall of St. Louis, Mo., for the construction of a railroad from Corsicana, Navarro County, through Fairfield, Freestone County, to Buffalo, in Leon County. They agree to secure subscriptions of \$40,000 for the project.

Dallas Belt.—F. M. Cockrell, of Dallas, the General Manager of this railroad, writes that it had been expected to award the contract for building the railroad during May. That has not been done, and there is now some uncertainty as to when the contract will be given out. The present plans for the belt road at Dallas include the construction of about nine miles of railroad.

Duluth, Springfield & Gulf.—The recent organization of this company, with the charter secured under the Iowa laws, is reported. The company apparently takes the place of the former Springfield, Sedalia, Marshall & Northern and Brookfield & Northern. Surveys were made by that company through Missouri from Springfield, to Sedalia and north crossing the Missouri River at Dewitt. The present company proposes a line through Missouri over this route, and through Iowa and other States. J. P. Tracy, of Springfield, Mo., is the President; W. J. Cox, of DeWitt, Mo., is General Manager, and H. N. Armstrong, of Springfield, is Chief Engineer.

Fort Plain & Richfield Springs.—The projectors of this proposed railroad from Fort Plain to Richfield Springs, N. Y., state that their present plans contemplate the building of the road during the coming season. The right of way has been secured, except in the town of Minden.

Gulf & Interstate.—The projectors of this railroad, which is the Populist scheme for a North and South railroad, have secured a separate charter in Texas, where work has been going on for some months. This charter is for a line from Port Bolivar, Galveston County, to a point between Devers and Raywood on the Southern Pacific, in Liberty County. The incorporators are: C. Jones of Oklahoma, L. E. Steele of Galveston, N. C. Jones of Kansas, H. L. McWilliams of Houston, A. J. Johnson, H. B. Knight, W. Scott and Franklin Babcock of Port Bolivar, Tex., and L. Beadle, Kansas City.

Hinton & New River.—The engineers of this line, which is to be about 20 miles in length, and to follow New River in West Virginia from Hinton, Summers County, on the Chesapeake & Ohio, to a connection with the Norfolk & Western, have made preliminary surveys, and the officers of the company and a number of gentlemen who are expected to furnish the money for beginning the work, made a trip over the proposed line last week. The line, as surveyed, passes through the celebrated New River coal country, and opens splendid timber lands.

Kingfield & Dead River.—Work on this railroad is being pushed day and night from Kingfield, Me. The track is laid four miles from the village. The trains will be running to the terminus at Drew's mill, Jerusalem, early next week. It is reported that a hotel will be built at the end of the route this summer.

Little Rock, Hot Springs & Texas.—The contractors have begun the grading on this new road, near Hot Springs, Ark. The contracts for grading the first 35 miles between Hot Springs and Benton, have already been let to Spencer & Maney, Hot Springs, J. H. Barrett, J. E. Collins, Johnson & Hanson, W. H. Corder, W. H. Kennedy, all of Benton, Ark. J. P. Nelson, of Hot Springs, General Manager of the company, expects to let contracts for grading 75 miles additional westward from Hot Springs within the next 60 days. The track-laying on the section now under contract will begin about June 25. The iron bridges to be built will have 200 ft. spans. One structure will have three spans of that length, and another will have two such spans. Uriah Lott is President of the company, and D. C. Rugg is Secretary and Treasurer. The company's headquarters are at Hot Springs, Ark.

Memphis, Heber Springs & Northwest Arkansas.—The route of this projected road is from Bald Mountain, on the Iron Mountain, north to Heber, Cleburn County, Ark., a distance of 70 miles. J. R. B. Moore, of Heber, Ark., the President, writes that the surveys for the route are being made, and that he will soon be prepared to receive bids for the construction work. The officers of the company are: J. R. B. Moore, President, Heber, Ark.; R. P. Hitchcock, Vice-President, Batesville, Ark.; John B. Jones, Treasurer, C. B. Meyers, Secretary, Little Rock, Ark.

Mohsville & Adamstown.—This company was incorporated at Harrisburg, Pa., on May 29, to build a road from Mohsville, in the County of Berks, through the borough of Adamstown, in Lancaster, Pennsylvania. The length of the road will be 7½ miles. L. T. Custer, Adamstown, Lancaster County, is President. The Directors are Esaias Billingsfelt, S. W. Miller, A. C. Snader, R. M. Hyman, H. G. Mohn, all of Adamstown, and Isaac G. Spatz, Mohsville, Pa., and Wellington Van Reed, Vincent S. Seltzer and Dr. J. B. Sterling, of Reading.

Mountain Valley Coal & Coke Co.—The railroad being built for this company leaves the Coal Valley Branch of the Georgia Pacific about a mile east of Coal Valley, and the distance to the mines of the Virginia & Alabama Coal Company is about two miles. The surveys have been completed and the contract for grading and track-laying has been let to John E. Lacey, of Jasper, Ala. The work is light, the maximum grade 79.2 ft. a mile. The maximum curvature is 8 per cent. The grading was begun early in May and about 10 per cent. of that work is now finished. The officers are: T. T. Hillman, President, Birmingham, Ala.; H. E. McCormack, Secretary, Treasurer and Superintendent, Oakman, Ala.; H. F. Wilson, Jr., of Oakman, Ala., is the Engineer in charge.

New Orleans & Northwestern.—The Receiver of this railroad has just completed the extension to Kellers, near Bastrop, La., on the Houston, Central Arkansas & Northern Railroad, the construction of which was authorized last year. The railroad has been in operation from Vidalia, La., opposite Natchez, Miss., northwest to Rayville, 60 miles, over three years. The extension just completed crosses the Vicksburg, Shreveport & Pacific Railroad, and gives the company a connection with the Missouri Pacific lines at Bastrop. The extension is 17½ miles long and was built by Bagnell & Johnson, between December last and May 4, when the track-laying was finished. The line crosses the Bouffé River with a Howe truss draw-span of 140 ft. The road is operated by Lewis K. Hyde as Receiver. C. A. Sharman, of Natchez, Miss., is the General Manager.

New Roads.—The project of Col. Frank Ross, of Tacoma, Wash., for a railroad from Buckley to Enumclaw, Wash., and to Natchez Pass, previously referred to, is a private enterprise of that gentleman in connection with the Puyallup Harbor Terminals. Ogden & Bosworth, of Tacoma, are the engineers. It is to extend from a point between Buckley and Enumclaw, up the Green River to the Natchez Pass, thence to North Yakima, about 35 miles to the Pass and 50 miles from there to Yakima. A preliminary survey has been made. The building of the line will depend upon certain other enterprises in which Col. Ross and his associates are interested, in connection with the Puyallup Terminals.

D. W. Hines, of Langdon, N. D., representing the farmers, in the Thief River Valley, is in Duluth in connection with a project for building a railroad from Drayton, N. D., to Thief River. The Duluth & Winnipeg is asked to extend its line from Deer River to Thief River to make the Duluth connection. The district to be reached by the new road is a fertile wheat country, and the farmers are now compelled to haul their crops from twenty to sixty miles to reach the railroad. Farmers along the new line will give a right of way, grade the roadbed and give in addition a cash bonus.

A meeting was held at Manahawkin, N. J., last week, to arrange for the building of a short line of railroad to the seashore, beginning at Hanover, on the line of the Pennsylvania Railroad, and extending to Manahawkin, where it will connect with the Long Beach road. No definite plan has yet been adopted.

Operations have begun on the new railroad of Wood & Childs, at Cammal, Pa. About 100 Italians are employed in the grading. About ten miles of the road will be built this summer.

New York, Susquehanna & Western.—The New York harbor terminals of this company, near Weehawken, have been completed and are now in use. These terminals are extensive and have been planned to handle a large tonnage of coal and general traffic. The work of constructing the terminals was commenced in August, 1892, and has included a short terminal branch and a double track tunnel through the Palisade mountains.

Pennsylvania.—The company's officials have notified the councils of Johnstown, Pa., that, owing to dull business and the recent flood losses, the company has decided not to undertake the proposed extension through that city.

Petersburg Belt.—A large number of bids have been received from contractors for the construction of the six-mile belt line to be built around Petersburg, Va., by the Atlantic Coast Line. The contract for the work will probably be awarded this week. The belt line is to begin at a point on the Richmond & Petersburg, near the Swift Creek bridge, and extend through Chesterfield County, crossing the Appomattox River, then making a junction with the Petersburg Railroad. The iron bridge over the Appomattox River and the expense of condemning valuable right of way, will bring the cost of the construction of the line up to \$200,000.

Roaring Creek & Charleston Railroad.—Work on this line is progressing well, although it was hindered by the high water of last week. The rails are laid, and the road is in use as far as Scott's Mills, 20 miles. The new bridge at Monroe, W. Va., was tested last Friday. It will let the track layers and traffic over the river to Womelsdorf, and will make possible the early completion of the road. The company is using a number of West Virginia Central & Pittsburgh engines in its work. The line is being built between Belington and Elkins, W. Va. John Potts is Superintendent.

Texas Midland.—President E. H. R. Greene, of Terrell, Tex., writes from that point that the contract for the 20 miles of road from Roberts north to Greenville, Tex., has been awarded to the Bethune-Craney Construction Co., of St. Louis.

Toledo & Ohio Central.—The prospects of construction work beginning on the belt line at Columbus, O., shortly, are best shown by the announcement that the company has begun to condemn a right of way where it has not been secured otherwise. The first condemnation suit was begun in the courts at Columbus this week.

West Virginia Central & Pittsburgh.—Engineers are surveying from Elkins, W. Va., through the headquarters of Greenbrier River across the divide, to a connection with the Chesapeake & Ohio Railroad in Greenbrier County. The proposed line is one which has been suggested for a long time. It will be expensive to build on account of the rough country through which it will pass. The company already has plans made for a continuation to Webster Springs, which is a part of the route in question. The extension would follow one of the Cheat River tributaries as far as Collett gap, where it will enter the Greenbrier valley, and crossing Pocahontas and Greenbrier counties, find a connection with the Chesapeake & Ohio, near the Virginia State line. The object of building the road is double, as it will give a direct outlet to the South and will, at the same time, open up a splendid and enormous territory which is rich in minerals and timber, much of which is already owned by those interested in the company.

GENERAL RAILROAD NEWS.

Brigantine Beach.—Lewis Groff, of Atlantic City, N. J., has asked for a receiver to be appointed for this railroad. It is about 14 miles long, from Pomona on the Camden & Atlantic, to Brigantine, N. J. The railroad has defaulted in the payment of interest on its bonds since 1890. The Holland Trust Co., of New York, is the trustee of the bonds, and since the above suit was filed, it has begun proceedings for foreclosure.

Chicago, Milwaukee & St. Paul.—The earnings of the company for the month of April are reported in the following statement:

	1894.	1893.	Dec.
Gross earn.	\$2,257,234	\$2,788,637	\$531,403
Oper. expen.	1,547,813	1,982,184	434,371
Net earnings	\$709,420	\$806,452	\$97,032
Ten months to April 30.			
Gross earn.	\$26,684,295	\$30,136,882	\$3,452,587
Oper. expen.	17,156,614	19,963,828	2,807,213
Net earn.	\$9,527,681	\$10,173,054	\$645,374

Pennsylvania.—The statement of earnings in April on the Eastern lines makes the following comparisons:

	1894.	1893.	Dec.
Gross earn.	\$4,764,016	\$5,895,492	\$1,131,476
Oper. expen.	3,366,187	4,199,381	833,194
Net earn.	\$1,397,829	\$1,696,111	\$298,282

The earnings of the Western lines decreased \$742,016 in gross, and net earnings decreased \$303,451. The gross earnings of the system decreased in April \$1,873,492, and net earnings decreased \$601,733.

Four months to April 30.

	1894.	1893.	Dec.
Gross earn.	\$17,838,529	\$22,041,668	\$4,203,139
Oper. expen.	13,043,724	16,836,795	3,793,071
Net earn.	\$4,794,805	\$5,204,873	\$410,068

The gross earnings of Western lines for four months decreased \$2,381,404, and net earnings decreased \$359,420. The system for four months shows a gross decrease of \$6,584,543, and a net decrease of \$769,488.

Colorado Eastern.—Articles of incorporation of the company, with Bernard J. Burk, of New York; Henry T. Rogers, C. Lucien M. Cuthbert, Eldredge H. Sabin, Jesse P. Sherman and Charles B. Rhodes, all of Denver, as incorporators, were filed in Colorado last week. The company is a reorganization of the road recently sold at foreclosure. An extension of the road from Scranton, Col., through Arapahoe, Elbert, Lincoln and Kit Carson Counties to a point on the State line is proposed.

Duluth, Missabe & Northern.—Leonidas Merritt has begun a suit for \$45,000 against the railroad for services and expenses while acting as vice-president of the road and also while engaged as its financial agent in floating its bonds. The time for which the claim is made was from October, 1892, to October, 1893, during which he did not receive any compensation.

Jacksonville, Tampa & Key West.—Judge Call, of the United States Circuit Court, at Jacksonville, Fla., has appointed R. B. Cable, General Manager of the road, as additional Receiver of the property, on the application of Archibald Rogers, of New York city. The order appointing Mr. Cable makes his receivership subordinate to that of J. H. Durkee, who was appointed some months ago in a suit of a Philadelphia Trust Company, trustee under one of the mortgages. Mr. Cable's appointment as Receiver is favorable to the interests of R. H. Coleman, President of the railroad, and does not in any way effect Mr. Durkee's administration. It is said that the appointment of a second receiver was desired by the Coleman interests to prevent the success of an alleged effort by what is known as the Mason-Young interests, which opposes the Coleman interest, to secure the removal of the Receiver.

New York & New England.—The Reorganization Committee, which published its plan on April 27, announces that 35,710 shares of the preferred stock of the railroad company, out of a total of 38,176 shares, and 163,815 shares of common stock out of a total of 198,150 shares, have been deposited under the plan. Second mortgage bonds to the amount of \$1,502,000 have been deposited.

Pittsburgh, Akron & Western.—Judge O. C. Voorhis, of the Common Pleas Court, at Akron, O., has ordered the sale of the railroad on proceedings by the Central Trust Co. of New York, in foreclosure of a mortgage of \$3,600,000. The road is now operated by William A. Lynch, formerly President of the Company, as Receiver of the property. The line is 165 miles long, from Akron to Delphos, O.

Savannah & Atlantic.—This railroad, which is a branch of the Central Railroad of Georgia, from Savannah to Tybee Beach, was again opened for traffic May 20. There are at present four daily trains running between Savannah and Tybee. The service will be increased as the season advances. Tybee Hotel has also opened. It will be remembered that this line was almost entirely washed away during the heavy storm on the Atlantic coast last season.

Sioux City Terminal & Warehouse Co.—The Trust Company of North America, of Philadelphia, has made an application for foreclosure on the first mortgage bonds of the company, for \$1,125,000. The Credits Communication Co., of Sioux City, now controls the property.

Tennessee River, Ashville & Coosa River.—This road, extending from Asheville to Whitney, Ala., has been ordered sold to satisfy a claim of \$16,000. The road is only four miles in length, and was built in 1890. It was projected to extend to Sheffield, Ala., and surveys were made to that point. Andrew Johnson was General Manager at Asheville.

TRAFFIC.

Chicago Traffic Matters.

CHICAGO, May 28, 1894.

Substantial progress has at last been made toward a settlement of the passenger rate war, west of here, and unless other complications arise, before the negotiations now being conducted are brought to a termination, it is certain that all the difficulties now existing will be substantially removed. After a futile attempt to secure the coincident consideration of both west and eastbound business, it was determined to consider the westbound immigrant question first. The Union Pacific signified its willingness to place its immigrant business in the control of the clearing house of Western lines, provided its proportion of this business was increased somewhat. The Atchison finally agreed to this, and stated its willingness to rejoin the clearing house. The other lines, thereupon, ratified the action of the sub committee in accepting this solution of the problem, and voted to withdraw the \$16.10 basing rate from the Missouri River to California and intermediate points on and after June 3; regularly authorized immigrant tariff rates, as authorized and in effect for business on Feb. 28, 1894, to be the only authorized basis of rates available for business of that character after that date. The meeting then took up the consideration of eastbound business and excursion rates. After considerable discussion the Union Pacific made an agreement with the Advisory Board not to pay any commissions to brokers in the First Ward, New York, to be used in influencing this business. The Atchison was willing to go farther than this, but accepted the proposition and made a similar agreement. The Western Passenger Association lines then ratified this action. When the matter of excursion rates was taken up a heated discussion followed. Some of the roads admitted having offered various concessions in the way of side rides, but stated that in most instances they could be withdrawn. It was finally agreed that the basis of excursion rates for Colorado and intermediate territory should be one fare for the round trip, with no concessions. The Atchison would not agree to any higher rate nor would it agree to make any higher rate than \$15 for the round trip from Missouri River to Denver for this business. The matter now rests largely upon the good faith of the parties to the various agreements. Neither the Union Pacific nor the Atchison has re-entered the Western Passenger Association.

The Western lines having arrived at a settlement of the freight rates, in Western and Southwestern territory, will now give attention to the 20-cent flour and grain rate from St. Paul and Minneapolis, by lake. A meeting is to be held at Minneapolis to-morrow, at which it will be determined whether the St. Paul-Chicago rail lines will meet the rate or not.

The new Western Trunk Line Committee has decided that all freight delivered to the lines after June 5 shall be billed at the then current full tariff rates, and that no refund shall be made on such business under the plea that it was in transit before the advance until after it shall have been referred to the committee for determination.

Eastern lines have postponed the putting into effect of their notice of withdrawal of all through trans-Mississippi rates and divisions to eastern points, until June 15. A conference of all interested lines will be held May 31, at which it is possible that a better understanding may be arrived at. A meeting of the Central Traffic Association managers will be held June 6, to consider the report of this conference.

The Chicago Freight Bureau is endeavoring to prevail upon the Illinois State Railroad Commissioners to adopt the official classification, instead of the present classification, on the ground that the present arrangement works a discrimination against Chicago in favor of Eastern points on consignments to interior Illinois towns. Among a large number of cases instanced, the following are noted:

	1	2	3	4	5
Cincinnati to Carbondale . . .	408 m.	41.0	37.00	19	17
Chicago to Carbondale . . .	308 m.	56.4	46.06	36.19	25.20
Difference		15.4	9.06	9.19	6.3
Toledo to Decatur . . .	323 m.	39	35.0	26.0	18.15
Chicago to Decatur . . .	173 m.	46.8	37.2	28.8	20.15
Difference		6.8	2.2	2.8	2.0

The indications are that the Eastern roads are accepting in good faith the awards of Arbitrator Walker, and are endeavoring to carry the same into effect. The real test of the agreement will not come until next month, when an attempt is made to even up the May tonnage.

Announcement is made that the lake and rail rates will be restored June 7, to the basis of the tariff of April 2, for all classes of freight except flour and grain products, which will be advanced to 15 cts. per 100 lbs. from Chicago to New York; 17½ cts. from Duluth, and 20 cts. from Minneapolis to New York.

The Chicago and Ohio River lines, while not in favor of the so-called homeseekers' excursions to Southern points, have agreed that lines North of the Ohio river may join in the excursions announced for May 29 and June 5.

The Wisconsin Central has given notice that on June 1 it will put into effect a party rate of 2 cents a mile for parties of 10 or more traveling together. This was the principal amendment to the agreement of the Western Passenger Association, which this company contended for, and, failing to obtain, withdrew from the Association. Association lines will meet the rates only to and from points where they are competitive with the Wisconsin Central.

The terminal charge for switching out and in of the Stock Yards in Hammond, Ind., is made effective by Western Freight Association lines June 1, and applies on live stock and all freight received from or delivered to the stock yards or industries located on the tracks of the Union Stock Yards railway, the Indiana State railway and the Northern Indiana railroad. The charge is \$2 a car, not \$20, as the types made me say in my dispatch last week.

Other Chicago traffic news will be found on page 391.